FISHERY MANAGEMENT INVESTIGATIONS

FEDERAL AID IN FISH RESTORATIONS
2001 JOB PERFORMANCE REPORT
PROGRAM F-71-R-26

Steven M. Huffaker, Director

REGIONAL FISHERIES MANAGEMENT INVESTIGATIONS
UPPER SNAKE REGION (Subprojects I-G, II-G, III-G, IV-G)

PROJECT I. SURVEYS and INVENTORIES
- Job a. Upper Snake Region Mountain Lakes Investigations
- Job b Upper Snake Region Lowland Lakes Investigations
- Job c. Upper Snake Region Rivers and Streams Investigations

PROJECT II. TECHNICAL GUIDANCE
PROJECT III. HABITAT MANAGEMENT
PROJECT IV. LAKE RENOVATION

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2001 ANNUAL PERFORMANCE REPORT

State of: Idaho

Program: Fisheries Management F-71-R-26

Project: I-Surveys and Inventories

Subproject: I-G Upper Snake Region

Job No.: a

Title: Mountain Lakes Investigations

Contract Period: July 1 2001 to June 30, 2002

ABSTRACT

A total of 13 mountain lakes were surveyed by Idaho Department of Fish and Game fisheries personnel in combination with U. S. Forest Service employees. All samples included angling, gillnetting or a combination of these methods to assess the population characteristics and relative abundance of salmonid species found in these water bodies. At least one trout species (cutthroat trout *Oncorhynchus clarki*, rainbow trout *O. mykiss*, brook trout *Salvelinus fontinalis* or hybrid rainbow x cutthroat trout) was found in 12 of the 13 lakes sampled. Mean size of fish sampled was greater for lakes that had not been recently stocked. Natural reproduction of brook trout was found in 25% of the mountain lakes sampled.

Authors:

Dan Garren
Regional Fishery Biologist

OBJECTIVE

To obtain current information for fishery management decisions on mountain lakes, including angler use and success, fish population characteristics, spawning potential, stocking success, limnology, morphology, and notes on other aquatic life and develop appropriate management recommendations.

METHODS

Fish collection utilized standard lowland experimental gill nets (both floating and sinking) tied to the shoreline and set perpendicular to the bank. Nets were fished overnight, and all fish were removed, identified, measured (total length) and recorded. Additional sampling used standard angling methods (fly fishing, spin-casting or bait fishing) to collect fish. Anglers involved in fish collection recorded hours spent fishing as well as species, number and length of fish caught.

RESULTS

Idaho Department of Fish and Game (IDFG) personnel sampled 13 mountain lakes (Broad, Star Hope, Muldoon, Fall Creek #1 and #2, Lake Creek, Bellas, Big Fall Creek, Kane, Quake, Green, Grant Creek and Angel lakes; Table 1). Fish species encountered included rainbow trout *Oncorhynchus mykiss*, cutthroat trout *O. clarki*, brook trout *Salvelinus fontinalis* and hybrid rainbow x cutthroat trout. At least one fish species was encountered in 12 of the 13 lakes sampled. One lake (Broad Lake) had both brook trout and hybrid trout, while three lakes (Muldoon, Lake Creek and Star Hope lakes) all had cutthroat trout, brook trout and hybrid trout present. Only sampling in Fall Creek Lake #1 yielded no fish. Calculation of catch rates was not possible due to lack of information in most lakes. However, overall catch in each lake was typically low and never exceeded 100 fish (mean catch of 33 fish per lake). Data for specific lakes sampled is given in Appendix A.

Mean lengths of fish present in sampled waters were correlated with the number of years post-stocking sampling occurred to get an estimate of trout growth in high mountain lakes in Upper Snake Region. Results are displayed in Figure 1 and show that fish are surviving as much as five years post-stocking. Growth rates based on mean length data show trout growth to be slow (Table 2).

Table 1. High mountain lakes in Upper Snake Region sampled during 2001 and species of salmonids encountered in each lake. Mean size of trout sampled is presented in parentheses.

Lake name	Species present (mean size)		
	Cutthroat trout	Rainbow trout[a]	Brook trout
Angel		(235 mm)	
Bellas	(235 mm)		
Big Fall Cr	(227 mm)		
Broad	(310 mm)	(289 mm)	(95 mm)
Fall Cr #1			
Fall Cr #2		(299 mm)	
Grant Cr	(187 mm)	(241 mm)	
Green	(300 mm)		
Kane	(316 mm)		
Lake Cr	(220 mm)	(279 mm)	(177 mm)
Muldoon	(260 mm)	(293 mm)	(141 mm)
Quake		(330 mm)	
Star Hope	(262 mm)	(277 mm)	(150 mm)

[a] Rainbow trout includes fish classified as hybrid rainbow x cutthroat trout.

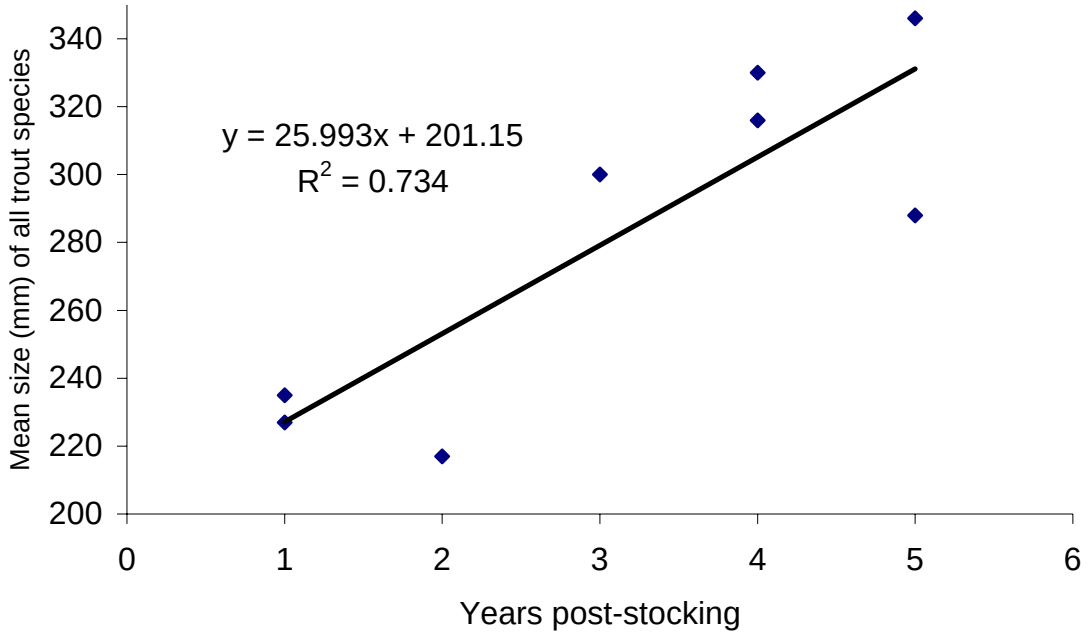

Figure 1. Mean size (mm) of trout captured during mountain lake sampling (Upper Snake Region, 2001) and the number of years post-stocking of a given water body. Fish represented in the regression are just the species stocked by IDFG and did not include brook trout.

Table 2. Mean length of trout captured during mountain lake sampling in Upper Snake Region during 2001 and the years post-stocking for each lake.

Years post stocking	1	2	3	4	5	6
Mean length (mm)	234	252	271	289	308	326

DISCUSSION

Fish stockings by IDFG appear to be successful and are providing fishing opportunities for anglers several years following stockings. Growth (based on mean size of fish captured following stockings) appears to be slow and consistent among lakes. The presence of naturally reproducing brook trout indicates that overwinter survival in some lakes is not limiting fish populations. This is also corroborated by the persistence of stocked fish several years post-stocking.

RECOMMENDATIONS

1. Future sampling of mountain lakes should include, in addition to standard fisheries assessments, physical and chemical classification of waters and habitat found in these lakes, access information, catch rates, condition factor and amphibian surveys.

APPENDICES

Appendix A. Survey forms for mountain lakes assessed in the Upper Snake Region in 2001

Lake Name: **Angel Lake**		Date: **8-7-01**	
IDFG Catalog # :		UTM:	
Major Drainage: **Big Lost**		Minor Drainage: **Fall Creek**	
County**: Custer**		Region: **6**	
USFS Ranger District: **Lost River**		Wilderness Area:	
Section: **5**	Township: **6N**	Range: **20E**	Elevation**: 10,278** ft.

PHYSICAL

Lake Type	1. cirque	2.**moraine**	3. slump	4. caldera	5. beaver
Total Surface area	**17.0** Hectares				
Depth Profile:			Aspect:		
1. **deep (75% of lake >6m deep)** 2 moderate (50% of lake >6m deep) 3. shallow (25% of lake >6m deep) Maximum Depth 108 feet Average Depth 50 feet			1. Lake has north facing exposure 2. Lake has south facing exposure 3. **Lake has east facing exposure** 4. Lake has west facing exposure 5. Lake is exposed in all directions		

CHEMICAL

Alkalinity	mg/1	pH **8.5**	
Conductance **10**	umho/cm^2 @25c	Temp (surface) **15**	c
Secchi depth **10.0**	meters	Temp (bottom)	c

SPAWNING POTENTIAL

Inlet (s) **0** (number)	Outlet (s) **1** (number)
Length accessible for spawning	Length accesible for spawning
0 Meters	**0** Meters
Inlet spawning suitability: **4**	Outlet spawning suitability: **4**
1. excellent (abundant) 2. adequate (enough to maintain suitable spawning population) 3. fair (not adequate to maintain population) 4. poor (not suitable for successful spawning)	

USE

Campsites: **1** (number)	Fire Pits: **1** (numbers)	Litter **L** M H	
Trail around lake: **none** partial intermittent complete			
Trail Trampled? Yes No			
Access (km)	good trail	poor trail	**cross country**

BIOLOGICAL

Zooplankton Composition and Density			
Genera Identified	% of sample	Size	Density (o/l)

Appendix A. Continued.

INSECT COMPOSITION AND ABUNDANCE

Acquatic Genera	Relative abundnance			Terrestial Genera	Relative abundance		
	L	M	H	Flying ants	L	**M**	H
	L	M	H	Grasshoppers	**L**	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen (numbers)		Hours Fished **18** (total)			
Fish caught**: 56**	Fish/hour: **3.1**	Abundance	L	M	**H**

LENGTH FREQUENCY

Collection Method	Angling	**Gill net –26 net hours**

Total Length in mm

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400
RBT		1		5	28	18	3		
Total		1		5	28	18	3		

Fish Condition

	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range
RBT	238					

Stocking History

Year	Species	Number of Fish	Comments
9-2001	Golden Trout	300	
8-2000	Golden Trout	1,233	
8-1998	Rainbow Trout	500	
9-1990	Golden Trout	750	
8-1989	Cutthroat Trout	650	

Comments:

Appendix A. Continued.

Lake Name: **Fall Creek Lake #1**			Date: **8-8-01**
IDFG Catalog # :		UTM:	
Major Drainage: **Big Lost**		Minor Drainage: **Fall Creek**	
County**: Custer**		Region: **6**	
USFS Ranger District: **Lost River**		Wilderness Area:	
Section: **2**	Township: **5N**	Range: **20E**	Elevation**: 9,740** ft.

PH

YSICAL

Lake Type	1. cirque	2 **moraine**	3. slump	4. caldera	5. beaver
Total Surface area	**2.5** Hectares				

Depth Profile:	Aspect:
1. deep (75% of lake >6m deep) 2 moderate (50% of lake >6m deep) 3. **shallow (25% of lake >6m deep)** Maximum Depth **1.3** meters Average Depth **0.75** meters	1. Lake has north facing exposure 2. Lake has south facing exposure **3. Lake has east facing exposure** 4. Lake has west facing exposure 5. Lake is exposed in all directions

CHEMICAL

Alkalinity mg/1	pH **8.9**
Conductance **60** umho/cm^2 @25c	Temp (surface) **15.0** c
Secchi depth meters	Temp (bottom) c

SPAWNING POTENTIAL

Inlet (s) **1** (number)	Outlet (s) **1** (number)
Length accessible for spawning	Length accesible for spawning
1 Meters	**0** Meters
Inlet spawning suitability: **3**	Outlet spawning suitability: **4**

5. excellent (abundant)
6. adequate (enough to maintain suitable spawning population)
7. fair (not adequate to maintain population)
8. poor (not suitable for successful spawning)

USE

Campsites: **1** (number)	Fire Pits: **2** (numbers)	Litter **L** M H	
Trail around lake: **none** partial intermittent complete			
Trail Trampled? Yes No			
Access (km)	good trail	poor trail	**cross country**

BIOLOGICAL

Zooplankton Composition and Density			
Genera Identified	% of sample	Size	Density (o/l)

Appendix A. Continued

INSECT COMPOSITION AND ABUNDANCE

Acquatic Genera	Relative abundnance			Terrestial Genera	Relative abundance		
Caddis	L	M	**H**	**Grasshopper**	L	**M**	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen (numbers)		Hours Fished **2h 30m** (total)			
Fish caught**: 0**	Fish/hour: **0**	Abundance	**L**	M	H

LENGTH FREQUENCY

Collection Method	Angling	Gill net – net hours

Total Length in mm

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400
Total									

Fish Condition

	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range

Stocking History

Year	Species	Number of Fish	Comments
2000	Golden Trout	462	
1996	Golden Trout	1,719	

Comments:

Appendix A. Continued.

Lake Name: **Fall Creek Lake #2**		Date: **8-8-01**	
IDFG Catalog # :		UTM: **11T 0736569E 4852816 N**	
Major Drainage: **Lost River**		Minor Drainage: **Fall Creek**	
County**: Custer**		Region: **6**	
USFS Ranger District:		Wilderness Area:	
Section: **3**	Township: **5N**	Range: **20E**	Elevation**:10,300** ft.

PHYSICAL

Lake Type	1. **cirque**	2. moraine	3. slump	4. caldera	5. beaver
Total Surface area	**4.5** Hectares				

Depth Profile:	Aspect:
1. deep (75% of lake >6m deep) 2 moderate (50% of lake >6m deep) 3**. shallow (25% of lake >6m deep)** Maximum Depth meters Average Depth meters	1. Lake has north facing exposure 2. Lake has south facing exposure 3**. Lake has east facing exposure** 4. Lake has west facing exposure 5. Lake is exposed in all directions

CHEMICAL

Alkalinity mg/1	pH **9.3**
Conductance **50** umho/cm^2 @25c	Temp (surface) **15.0** c
Secchi depth meters	Temp (bottom) c

SPAWNING POTENTIAL

Inlet (s) **1** (number)	Outlet (s) **1** (number)
Length accessible for spawning	Length accesible for spawning
0 Meters	**0** Meters
Inlet spawning suitability: **4**	Outlet spawning suitability: **4**

9. excellent (abundant)
10. adequate (enough to maintain suitable spawning population)
11. fair (not adequate to maintain population)
12. poor (not suitable for successful spawning)

USE

Campsites: **3** (number)	Fire Pits: **0** (numbers)	Litter **L** M H	
Trail around lake: **none** partial intermittent complete			
Trail Trampled? Yes No			
Access (km)	good trail	poor trail	**cross country**

BIOLOGICAL

Zooplankton Composition and Density			
Genera Identified	% of sample	Size	Density (o/l)

Appendix A. Continued.

INSECT COMPOSITION AND ABUNDANCE

Acquatic Genera	Relative abundnance			Terrestial Genera	Relative abundance		
	L	M	H	**Grasshopper**	L	**M**	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen	(numbers)	Hours Fished	**20h 10m**	(total)		
Fish caught**:**	Fish/hour:	Abundance	L	M	H	

LENGTH FREQUENCY

Collection Method	**Angling**	**Gill net – 7.5 net hours**

Total Length in mm

Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400
RBT			4	2			12	8	1
Total			4	2			12	8	1

Fish Condition

	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range
RBT	299					

Stocking History

Year	Species	Number of Fish	Comments
			No Stocking records for this one

Comments:

Appendix A. Continued

Lake Name: **Lake Creek # 11**		Date: **8-11-01**	
IDFG Catalog # : **1500000188**		UTM: **271573 E 4842718 N**	
Major Drainage: **Big Lost**		Minor Drainage: **E. Fork Big Lost**	
County**: Custer**		Region: **6**	
USFS Ranger District:		Wilderness Area:	
Section:	Township:	Range:	Elevation**: 9,997** ft.

PHYSICAL

Lake Type	1. cirque	2. moraine	3. slump	4. caldera	5. beaver
Total Surface area	Hectares				

Depth Profile:	Aspect:
1. deep (75% of lake >6m deep) 2 moderate (50% of lake >6m deep) 3. shallow (25% of lake >6m deep) Maximum Depth meters Average Depth meters	1. Lake has north facing exposure 2. Lake has south facing exposure 3. Lake has east facing exposure 4. Lake has west facing exposure 5. Lake is exposed in all directions

CHEMICAL

Alkalinity mg/1	pH
Conductance umho/cm^2 @25c	Temp (surface) c
Secchi depth meters	Temp (bottom) c

SPAWNING POTENTIAL

Inlet (s) **0** (number)	Outlet (s) **1** (number)
Length accessible for spawning	Length accesible for spawning
0 Meters	**0** Meters
Inlet spawning suitability: **4**	Outlet spawning suitability: **4**

13. excellent (abundant)
14. adequate (enough to maintain suitable spawning population)
15. fair (not adequate to maintain population)
16. poor (not suitable for successful spawning)

USE

Campsites: **0** (number)	Fire Pits: **0** (numbers)	Litter **L** M H	
Trail around lake**: none** partial intermittent complete			
Trail Trampled? Yes **No**			
Access (km) **14**	good trail	poor trail	cross country

BIOLOGICAL

Zooplankton Composition and Density			
Genera Identified	% of sample	Size	Density (o/l)
Scuds			

Appendix A. Continued

INSECT COMPOSITION AND ABUNDANCE

Acquatic Genera	Relative abundnance			Terrestial Genera	Relative abundance		
Scuds	L	M	H		L	M	H
	L	M	H		L	M	H
	L	M	H		L	M	H

FISH SURVEY

Fishermen **2** (numbers)		Hours Fished **3** (total)			
Fish caught**: 0**	Fish/hour: **0**	Abundance	**L**	M	H

LENGTH FREQUENCY

Collection Method	Angling	**Gill net – 3 net hours**

	Total Length in mm								
Species	0-49	50-99	100-149	150-199	200-249	250-299	300-349	350-399	400
No fish caught									
Total									

Fish Condition	Total Length (mm)		Weight (g)		Condition (K)	
Species	mean	range	mean	range	mean	range

Amphibian data

	Number Caught or Observed	
Species	Juvenile	Adult
Frogs		**Abundant**

Stocking History

Year	Species	Number of Fish	Comments
9-1998	Rainbow Trout	500	
9-1995	Cutthroat Trout	500	

Comments:

Appendix B. Length frequency distribution information for trout collected during mountain lakes sampling in the Upper Snake Region, Idaho 2001.

	Lake Name												
CM Class	Broad	Star Hope	Mul-doon	Fall Cr #1	Fall Cr #2	Lake Cr	Bellas	Big Fall Cr	Kane	Quake	Green	Grant Cr	Angel
10													
11					2								
12					1								1
13													
14													
15													1
16													1
17													
18					1								
19					1								1
20		2	1										
21	1	1			1	1						2	4
22		1											2
23		3	1		2	1							7
24	1	2	1			1							7
25	1	3	2			4						2	4
26	3	8				4						1	1
27	1	6	3			5							2
28	2	5	4			6							1
29	3	6	2			5							2
30	7	10	6		2	2							2
31		4	6		3	1							1
32	4	3	1			2							
33		1	2		3	2				1			
>33	2	1	2		13								

Appendix B. Continued.

	Lake Name												
CM Class	Broad	Star Hope	Mul-doon	Fall Cr #1	Fall Cr #2	Lake Cr	Bellas	Big Fall Cr	Kane	Quake	Green	Grant Cr	Angel
10													
11													
12													
13													
14													
15							1					2	
16													
17													
18		1				1							
19						1	2					1	
20		2	1			1	1	5	1				
21						1		2			1		
22		2				2		2					
23		1	1			1	1	6					
24						1	1	1			1		
25								2	1			1	
26													
27		1					2		1		2		
28						1	1	1					
29			1								4		
30		2					1		5		3		
31	1		1								1		
32		2									3		
33									3		2		
>33		1							3		2		

Appendix B. Continued.

	Lake Name												
CM Class	Broad	Star Hope	Mul-doon	Fall Cr #1	Fall Cr #2	Lake Cr	Bellas	Big Fall Cr	Kane	Quake	Green	Grant Cr	Angel
10													
11		2	1			3							
12	1	5	4			1							
13	1	3	2			1							
14		3	11			4							
15			3			2							
16		2	2			6							
17	1	2	1			5							
18		2				5							
19	1		1			12							
20	1	5	3			6							
21	1	3	1			6							
22		1	1			3							
23													
24													
25													
26													
27													
28			1										
29													
30													
31													
32													
33													
>33													

2001 ANNUAL PERFORMANCE REPORT

State of :Idaho

Program: Fisheries Management F-71-R-26

Project : I-Surveys and Inventories

Subproject: I-G Upper Snake Region

Job No.: b

Title: Lowland Lake Investigations

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

We used experimental gill nets to assess fish populations and relative abundance of fish species in Henrys Lake during May 2001. These nets captured brook trout *Salvelinus fontinalis*, Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri*, hybrid rainbow trout *O. mykiss* x Yellowstone cutthroat trout and Utah chub *Gila atraria*. Catch rates of brook trout and hybrid trout show a slight decline over levels recorded in 2000, while Yellowstone cutthroat trout and Utah chub both show increases over 2000 levels. Dissolved oxygen levels were monitored in the lake to assess the possibility of a winterkill event. Dissolved oxygen concentrations remained above levels considered necessary for trout survival throughout the lake, and no unusual winterkill was observed during 2000-2001. The 2001 spawning operations at Henrys Lake produced 1,560,114 eyed cutthroat trout eggs and 376,662 eyed hybrid trout eggs. Cutthroat trout in the Hatchery Creek run averaged 438 mm and hybrid trout averaged 482 mm. We conducted a creel survey on Henrys Lake from May 26 through October 31. Creel clerks interviewed 777 parties representing 1,527 anglers. Harvest composition was 35% cutthroat trout, 58% hybrid trout, and 7% brook trout. Catch rate was 0.56 fish/h and harvest rate was 0.11 fish/h. Ten percent of both brook trout and cutthroat trout stocked are marked with a fin clip to estimate hatchery contributions to the lake. Creel clerks observed fin-clips on 15% of cutthroat trout and 20% of brook trout observed in the creel, which indicates hatchery production sustains the Henrys Lake fishery.

We used experimental gill nets to assess fish populations in Island Park Reservoir. Nets were set in standard locations used each spring. Catch rates on all game fish (rainbow trout, brook trout, kokanee *O. nerka* and mountain whitefish *Prosopium williamsoni*) and all nongame fish with the exception of Utah sucker *Catostomus ardens* declined, continuing a trend that began in 1998.

Gill nets were set in Mud Lake during May to determine if a winterkill event occurred during 2000-2001. Nets were fished for a period of four hours each, which documented the presence of both Utah sucker and Utah chub. Additional sampling was deemed unwarranted, as the presence of live fish suggests that a total winterkill did not occur.

Authors:

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Regional Fishery Biologist

Jim Fredericks
Regional Fishery Manager

Damon Keen
Assistant Fish Hatchery Manager

OBJECTIVE

To obtain current information for fishery management decisions on lowland lakes and reservoirs, including angler use and success, harvest and opinions, fish population characteristics, stocking success, return-to-the-creel for hatchery trout, and limnology, and to develop appropriate management recommendations.

METHODS

Henrys Lake

Population Monitoring

As part of routine population monitoring, gill net samples were collected from six standardized locations (total six net nights) in Henrys Lake on May 8, 2001 (Appendix A). Nets were set at dusk and retrieved the following morning. Set and pull times were recorded and captured fish were identified to species and measured for total length (TL; mm). Data analysis consisted of calculating catch rates as fish per net night. Data were assumed to be non-normal. Therefore, a Kruskal-Wallis one-way nonparametric analysis of variance (Ott 1988) was used to detect differences in catch rates among data collected from 1999 to present.

Creel Survey

Henrys Lake hatchery personnel conducted a randomized structured creel survey throughout the fishing season. Survey structure followed that of previous creel surveys on Henrys Lake. Creel clerks did angler counts at randomly generated times from a vantage point above the lake that allowed the majority of anglers to be counted. Additionally, a boat was driven around the lake to confirm the count made with binoculars and to include any anglers missed by this method. Counts were completed within one-half hour of starting. Interviews were conducted at random times throughout the day. Creel clerks intercepted anglers during their fishing trip to obtain method of fishing, time spent fishing, and number, species and length of fish both caught and released. Data were analyzed using the Idaho Department of Fish and Game (IDFG) creel census program.

In addition to monitoring catch rates on Henrys Lake, creel clerks recorded fin clips on trout retained in the creel. Ten percent of both brook trout *Salvelinus fontinalis* and Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* stocked are marked with a fin clip annually. By comparing the proportion of clipped fish in the creel to the proportion of fish marked in the population, estimates of contributions from the hatchery to the lakewide population can be derived.

Spawning Operation

The Hatchery Creek fish ladder was opened on February 27 and remained in operation until April 30. Fish ascending the ladder were identified as cutthroat trout or hybrid rainbow trout *O. mykiss* x cutthroat trout and enumerated. A subsample of approximately 10% of each group was measured for total length (mm). Cutthroat trout were produced using ripe females spawned into seven-fish pools and fertilized with pooled milt from four to seven males. Hybrid trout were produced with cutthroat trout eggs and Kamloops rainbow trout milt obtained from Hayspur Hatchery. The hybrid trout contribution was sterilized by inducing triploidy through heat shocking the eggs post-fertilization. Hybrid eggs were placed in 27^{o}C water and held in this condition for 20 minutes. All of the hybrid trout eggs were shipped to Mackay Hatchery for hatching, rearing, and subsequent release back into Henrys Lake. One lot of cutthroat trout eggs was shipped to Ashton Hatchery for rearing and release into Golden Lake.

Ovarian fluids were collected for disease testing from cutthroat trout during spawning at Henrys Lake Hatchery. Ovarian samples were taken from egg pools of seven females. All seven-fish female egg pools were tested for bacterial kidney disease. Viral samples were taken randomly from 28 seven-female egg pools. A mixed-sex group of 60 adult cutthroat trout was also sacrificed for disease testing. All samples were sent to the Eagle Fish Health Laboratory for analysis.

Water Quality

During January, February and March 2001 dissolved oxygen concentrations and water temperature readings were taken at established sampling sites to assess the potential for a winterkill event (Appendix B). Sites were located using GPS readings and holes in the ice were drilled with an ice auger prior to sampling. Samples were taken using a YSI oxygen meter at each site at the surface of the water, at the bottom of the ice and every meter thereafter until the bottom of the lake was encountered. Data were compared to previous years in order to estimate the potential for winterkill.

Additionally, from July to October, hatchery personnel collected temperature/dissolved oxygen profiles and Secchi disk transparencies from four stations (300 m off the county boat dock, 300 m off Wild Rose marina, 300 m off shore between Pittsburgh Creek and Targhee Creek, and 300 m off of the Cliffs boat ramp). Each site was located using established GPS readings.

Island Park Reservoir

Since the 1992 drawdown and renovation of Island Park Reservoir, annual standardized gillnetting has been used to monitor species composition, relative abundance, and size structure of the fishery in the lake. On May 16-17, four sinking and three floating experimental gill nets were fished at standardized locations (seven net nights). Set and pull times for each net were recorded, and all captured fish were identified, enumerated and measured. Catch rate data were compiled and compared to data from 1993-2000.

Ririe Reservoir

A routine creel survey was implemented on Ririe Reservoir to monitor catch and harvest rates and species composition in the harvest. Survey dates were June 8 to September 18, with random days and start times generated with the IDFG creel survey software. The survey utilized a roving interview and gathered incomplete trip information. No angler counts were done; consequently, data could not be expanded to estimate seasonal catch or harvest. Creel clerks were instructed to identify and measure all fish observed in the harvest and to record length of time spent fishing as well as residency status and type of gear used.

Mud Lake

Given the shallow nature of Mud Lake and substantial winter ice coverage, winterkill events are not uncommon. Two experimental gill nets were set in Mud Lake on May 22 to evaluate the potential winterkill event that reportedly occurred during 2000-2001. Nets were set in two different areas - Camas Creek and the west end of the lake. Total soak time for the nets combined was eight hours. Species encountered were identified, measured (TL) and released.

RESULTS

Henrys Lake

Population monitoring

A total of 75 fish were collected in seven net nights of effort with standard Henrys Lake gill nets. Coordinates for standard gill net locations are presented in Appendix A. Catch composition was 30% cutthroat trout, 43% hybrid trout, 8% brook trout, and 19% Utah chub *Gila atraria*. Cutthroat trout ranged in size from 193 to 481 mm total length, hybrid trout 250 to 630 mm, and brook trout 333 to 460 mm. Brook trout catch rates in gill nets have declined significantly from 2000 levels ($p=0.0013$, Kruskal-Wallis Nonparametric AOV, Figure 1). Catch rates for both hybrid trout and cutthroat trout were similar to previous years' catch rates. Utah chub catch rates are slightly higher than previous years' samples. However, the difference in these catch rates is not significant ($p=0.63$, Kruskal-Wallis test), primarily because of substantial variance in catch among nets.

Creel Survey

From May 26 through October 31, creel clerks contacted 1,527 anglers in 777 interviews. Anglers fished an estimated 165,825 hours on Henrys Lake in 2001 (Figure 2). Using the creel program, estimates were extrapolated and summarized. Catch rate was 0.56 fish/h and harvest rate was 0.11 fish/h (Figure 3). Effort was comprised of 49% fly fishing, 30% bait, and 22% lures. Total estimated catch for all fish during 2001 was 93,326, of which 17,759

were released for an overall release rate of 81%. Catch composition was 58% hybrid trout, 35% Yellowstone cutthroat trout, and 7% brook trout. Methods of fishing were summarized at 62% boat, 21% tube, and 17% bank angling. The average time spent fishing was 3.5 hours, and mean size of cutthroat trout, hybrid trout and brook trout in the harvest was 447 mm, 503 mm, and 452 mm, respectively (Table 1). Creel clerks recorded fin clips on 15% of harvested cutthroat trout, and 20% of brook trout (Table 2).

Spawning Operation

A total of 7,190 cutthroat trout (4,587 males and 2,603 females) ascended the spawning ladder between February 27 and April 30. Hybrid trout totaled 4,391 fish, 1,955 males and 2,436 females. Mean length for male and female cutthroat trout was 434 and 442 mm, respectively. Combined average cutthroat trout length was 438 mm. Hybrid trout males and females averaged 491 and 474 mm, respectively.

Cutthroat trout green eggs totaled 2,402,108 from 986 females for an average fecundity of 2,436 eggs per female. Eyed cutthroat eggs totaled 1,560,114 for an overall eye-up rate of 65%. A total of eleven spawn days were devoted to cutthroat trout spawning this year.

Hybrid trout green eggs totaled 856,800 from 357 females for an average fecundity of 2,400 eggs per female. Eyed hybrid trout eggs totaled 376,662 for an overall eye-up rate of 44%. A total of three spawn days were devoted to production of hybrid trout eggs during this year.

No egg batches or ovarian samples used in disease analysis tested positive for bacterial kidney disease or viral pathogens.

Water Quality Monitoring

Both winter and spring dissolved oxygen/temperature monitoring showed adequate trout habitat persisted through critical periods in the reservoir (Appendices B and C). No winterkill or summerkill were observed.

Island Park Reservoir

A total of 519 fish were captured with a combined gillnetting effort of seven net-nights in standard locations (Appendix D). Catch composition included nine species. Gamefish (rainbow trout, cutthroat trout, mountain whitefish *Prosopium williamsoni*, and kokanee *O. nerka*) comprised 11% of the total catch, compared to 26% in May 2000 samples. Utah chub *Gila atraria*, Utah sucker *Catostomus ardens*, and redside shiner *Richardsonius balteatus* comprised 89% of the catch, compared to 74% in 2000. Catch rates (number of fish per net night) on all species showed a decline that began in 1998 (Figure 4).

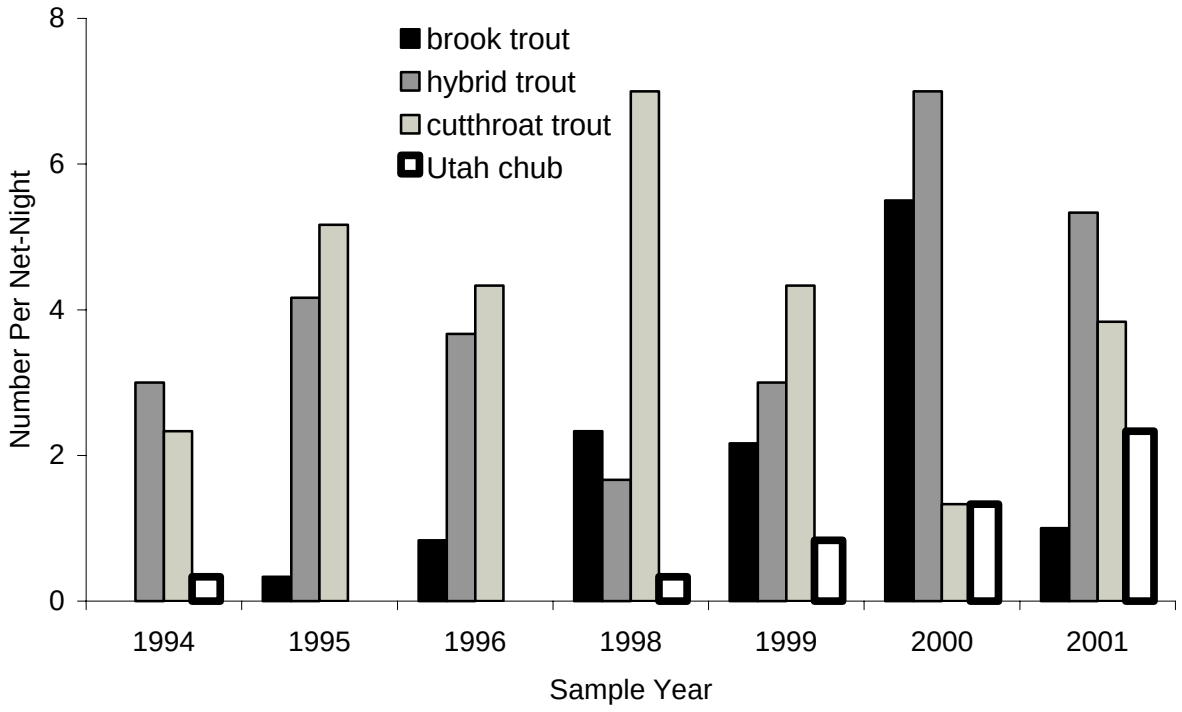

Figure 1. Species catch rates for gill net set in Henrys Lake Idaho, 1994 to 2001.

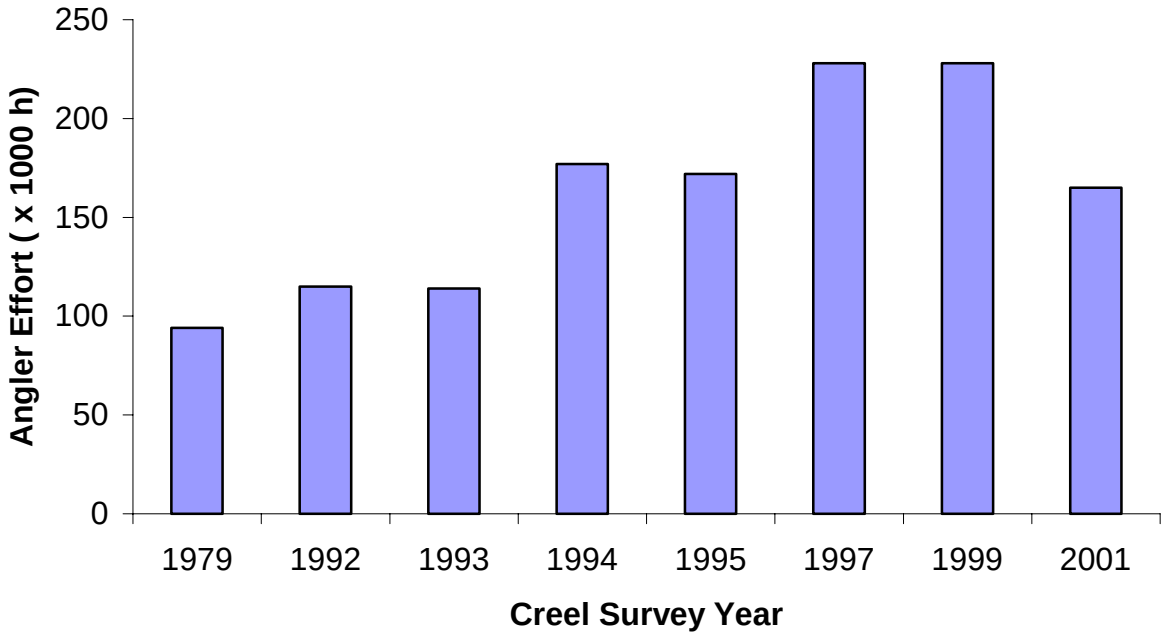

Figure 2. Annual angler effort obtained from creel surveys on Henrys Lake from 1979 to 2001, Henrys Lake, Idaho.

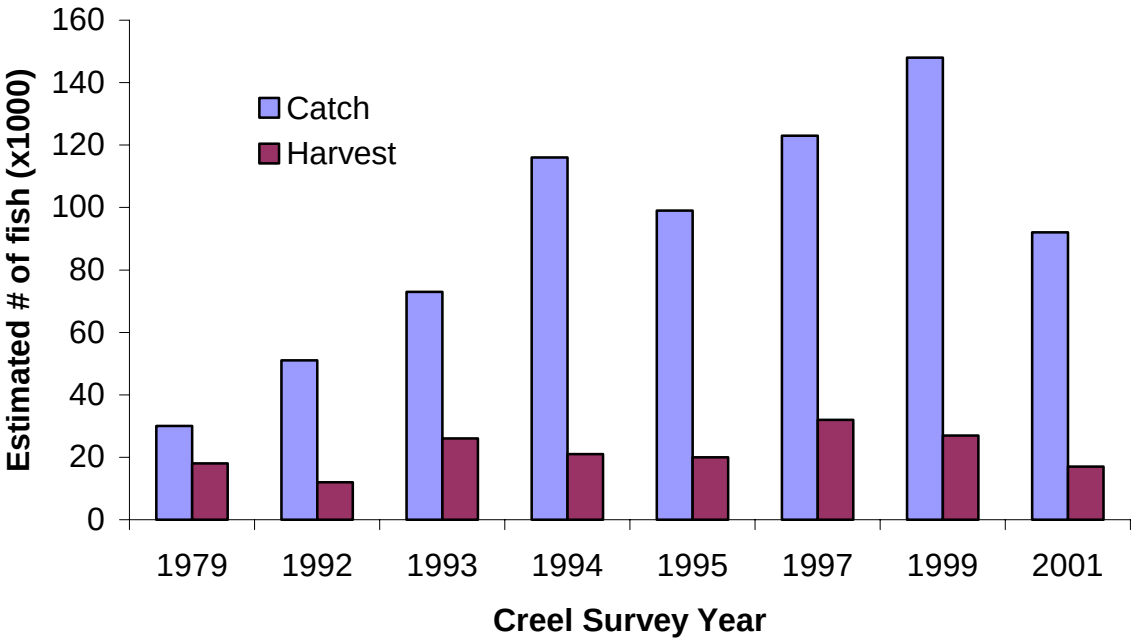

Figure 3. Estimated catch and harvest trends for trout in Henrys Lake creel surveys, 1979 to present, Henrys Lake, Idaho.

Table 1. Mean length of trout measured in creel surveys on Henrys Lake, Idaho.

	Mean length (mm)		
Year	Cutthroat	Hybrid	Brook
1980	430	460	391
1985	376	417	363
1990	427	460	432
1991	460	473	369
1992	452	475	417
1993	409	485	381
1994	419	437	424
1995	435	442	432
1997	427	435	389
1999	440	443	400
2001	447	503	452

Table 2. Summary of fin-clipped trout observed in creel surveys in Henrys Lake, Idaho.

Species	Year	Total number Examined	Number examined with clips	Percent Clipped
Brook Trout	2001	30	6	20
	1999	48	5	10
	1997[a]	11	1	9
Cutthroat Trout	2001	145	22	15
	1999	180	20	11
	1997[a]	178	8	5

[a] 1997 observations of fin-clipped fish are likely an underestimate due to lack of emphasis on creel clerks looking for fin clips.

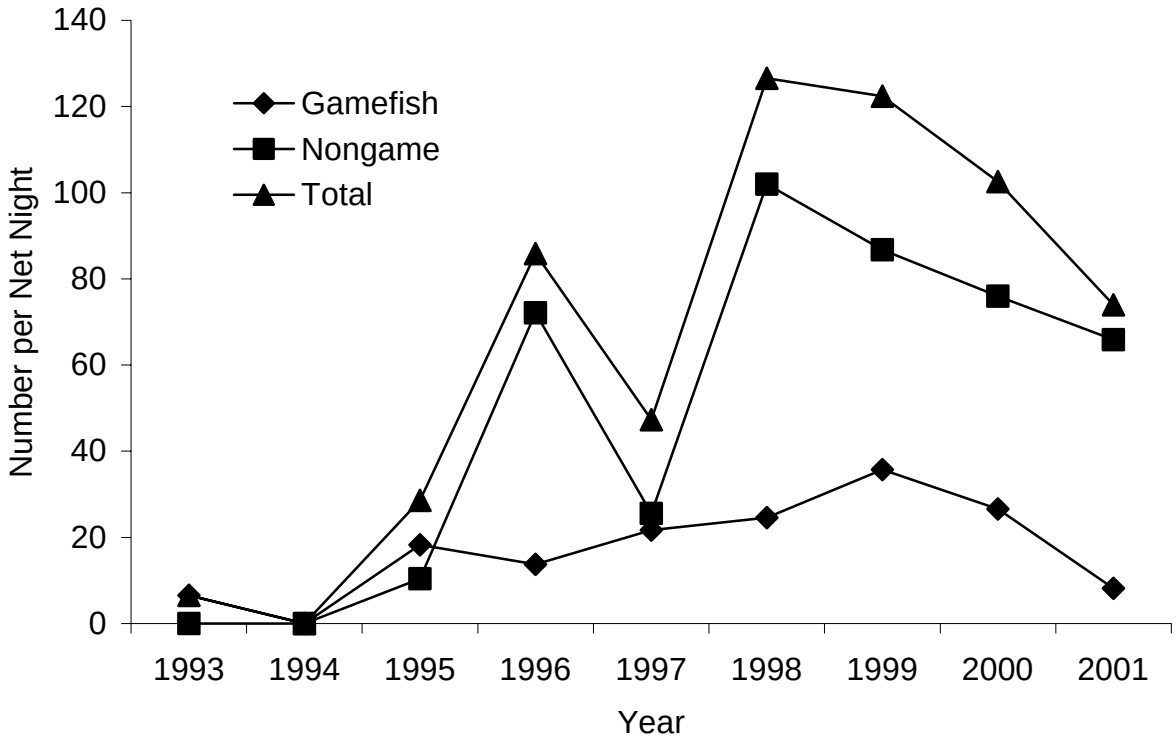

Figure 4. Gill net catch rates for gamefish and nongame fish in Island Park Reservoir, Idaho, 1993 to 2001.

Ririe Reservoir

From June 3 to September 30 creel clerks interviewed 216 anglers who fished 486 hours, caught 338 fish, and harvested 197 fish. Mean catch rate was 0.66 fish/h and mean harvest rate was 0.39 fish/h. Harvest composition was 47% rainbow trout, 22% yellow perch *Perca flavescens*, 23% kokanee, 2% Yellowstone cutthroat trout and 3% smallmouth bass *Micropterus dolomieu***.** Although very few smallmouth bass are being harvested in Ririe Reservoir, anglers reported catching numerous bass. In fact, smallmouth bass made up 27% of the total reported catch in the reservoir.

Mud Lake

We collected both Utah sucker and Utah chub in gill nets set in Mud Lake. No other fish species were collected. Nets were removed after soaking for four hours. Based on the presence of fish caught, it is apparent that a total winterkill did not occur during 2000-2001.

DISCUSSION

Henrys Lake

Population monitoring in Henrys Lake indicates the fishery is stable, with the exception of brook trout, which have not been stocked in Henrys Lake since 1998. Given the growth rate and estimated life expectancy of these fish in Henrys Lake, a decline in catch rates is expected. Life history investigations (Irving 1954, Spateholts 1984) indicate that very few brook trout survive past age four in Henrys Lake. Based on previous years' sampling by IDFG, naturally reproduced brook trout are not a significant proportion of the overall lake wide population. Concurrent with the decrease in catch rates of brook trout, the proportion of fin-clipped brook trout in the creel indicates that the fishery is driven primarily with hatchery production. The ratio of clipped fish should have been recovered in proportion to their abundance. Given that 10% of stocked fish were marked, a return of 10% marked fish in the creel would indicate hatchery fish sustain the population. Although higher than expected, the return of 20% clipped fish found in the creel survey suggests hatchery production is responsible for the majority of brook trout in the lake. Therefore, catch rates should decrease annually as the population diminishes due to natural and fishing mortality and the lake is not replenished by additional stocking.

The presence of Utah chub, an invasive species potentially capable of causing population-level effects to the trout population, also appear to be stable based on annual gillnetting trends. These fish have been a point of interest in the lake for several years, given the potential impacts they may have on the sport fishery in the lake. Future monitoring should incorporate some degree of focus on Utah chub.

The Henrys Lake creel survey, which is conducted on a semi-annual basis, has documented an increase in annual effort since the early 1990s. Regulation changes in Idaho during 1998 allowed anglers to use up to two rods while fishing. Creel surveys prior to 1998 report angler hours and represent one rod per angler. However, creel surveys from 1998 on still

report angler hours, but rod hours have likely increased. This increase in the number of rod hours is not separated in the current report and likely underestimates total effort represented as rod hours. Despite the increase in total effort over the past ten years, trout harvest in the lake has remained relatively constant. This is probably the result of changing values and perceptions of anglers. There has been more emphasis on catch and release in the sport fishing community since the 1980s. These changing values are likely reflected in the harvest rates observed in the lake.

Recommendations

1. Evaluate social and biological implications of reimplementing the brook trout stocking program.

2. Evaluate potential differences in catch rates per angler between years where one rod per angler was allowed, and years where multiple rods per angler were allowed.

3. Continue annual gill net efforts to monitor population level changes in the fish community.

Island Park Reservoir

During 1992, Island Park Reservoir was treated with rotenone to remove Utah chub from the system. The effort was unsuccessful at completely removing Utah chub, but the population was significantly reduced. Gillnetting trends in Island Park Reservoir are following a pattern expected from new reservoirs and those recently renovated. Densities of all fish populations increased from 1993 to 1998 and have been declining since then. All populations within the reservoir are experiencing the same trends and will likely level off as populations reach a balance with available nutrients and habitat. Continued monitoring should be used to document changes within the reservoir and to adjust stocking regimes as necessary.

Recommendations

1. Conduct a thorough lowland lakes survey in the near future to better assess the overall fishery.

2. Conduct a creel survey to estimate total angler use, catch rates and harvest of fish.

Ririe Reservoir

Catch rates for all species were very similar to estimates derived from the 2000 creel survey and indicate a stable fishery exists in Ririe Reservoir. Catch rates and the number of fish harvested did not differ significantly between survey years. One apparent trend observed from the current survey is the role smallmouth bass are playing in the fishery. Past surveys

have shown that smallmouth bass are not a large component in the harvest at Ririe Reservoir. This survey also documents this trend but shows that smallmouth bass are responsible for a significant proportion of the total catch. In fact, they were the second most frequently caught fish in the reservoir and the most abundantly captured, naturally reproducing species. Because the majority of smallmouth bass anglers rarely harvest bass, it is likely that the smallmouth bass component in the lake is underestimated.

Although the current year's survey is useful for monitoring catch rates, future surveys should be conducted in a more rigorous fashion and should include angler counts to estimate effort on the reservoir and information on angler preferences to aid in guiding management actions.

Recommendations

1. Conduct a thorough creel survey on Ririe Reservoir to include estimates of angler effort, catch rates and harvest. A year-round survey is recommended to incorporate the existing winter ice fishery.

2. Implement a thorough lowland lakes survey to assess the status of the fishery in Ririe Reservoir. Incorporate age and growth analysis of key fish species to assess year class strength and cohort analysis to aid in management of the lake.

Mud Lake

Gill net surveys documented the presence of two species of nongame fish in Mud Lake. Although no gamefish were captured in 2001 samples, it was evident that the winterkill of 2000-2001 was not complete; consequently, it is assumed that other species of fish are present. The 2001 surveys were not intended to be comprehensive or to be used in trend data analysis. Future surveys should be more extensive and diverse and focus on a comprehensive analysis of the total fish population.

Recommendations

1. Conduct a lowland lake survey to assess the sport fishery.

2. Develop a standard springtime survey to assess winterkill events likely to occur in Mud Lake.

LITERATURE CITED

Ott, Lyman. 1988. An introduction to statistical methods and data analysis. PWS-Kent Publishing Company. Boston, Massachusetts.

Irving, R.B. 1954. Ecology of the cutthroat trout in Henrys Lake, Idaho. Transactions of the American Fisheries Society 84:275-296

Spateholts, R.L. 1984. Ecology of naturalized and introduced stocks of brook trout in Henrys Lake, Idaho. Masters thesis. Idaho State University, Pocatello.

APPENDICES

Appendix A. Standard gill net locations for Henrys Lake, Idaho.

Target species	Coordinates
Species composition nets	12T 0469510 UTM 4943608
	12T 0467252 UTM 4944882
	12T 0467217 UTM 4940776
	12T 0467320 UTM 4943171
	12T 0467962 UTM 4942292
	12T 0468203 UTM 4940874
Utah chub nets	12T 0466151 UTM 4941808
	12T 0465595 UTM 4943472
	12T 0465805 UTM 4944934
	12T 0470050 UTM 4941061
	12T 0466078 UTM 4943357
	12T 0466194 UTM 4944759

Appendix B. Results from dissolved oxygen monitoring (mg/l), January through March 2001, Henrys Lake, Idaho.

One mile south of Pittsburgh Creek (44 38.836 N, 111 23.118 W)				
	Sample date			
Depth	1-5-2001	1-20-2001	2-8-2001	3-2-2001
Snow depth (mm)	100	130	450	75
Ice thickness (mm)	430	450	500	650
Ice bottom	6.8	11.68	11.8	11.1
1 meter	6.8	12.0	11.8	11.2
2 meter	6.4	11.0	10.3	9.2
3 meter	5.5	8.0	5.4	6.1
4 meter	4.0	6.0	5.8	4.9
5 meter	2.4	4.2	1.9	3.3
Sum 2-5 meters	18.2	29.3	23.4	23.5
Average ice 1-meter	6.8	11.6	11.8	11.2
Total g/m^2	25.0	40.9	35.2	34.6

300 yards off County Boat Dock (44 39.039 N, 111 25.935 W)				
	Sample date			
Depth	1-5-2001	1-20-2001	2-8-2001	3-2-2001
Snow depth (mm)	150	300	75 (wind)	150
Ice thickness (mm)	450	400	680	550
Ice bottom	6.8	11.7	11.3	10.1
1 meter	6.7	11.3	10.8	10.1
2 meter	6.5	8.9	8.2	6.2
3 meter	4.3	4.2	4.5	4.6
4 meter	2.2	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	12.9	13.1	12.7	10.8
Average ice 1-meter	6.75	11.5	11.0	10.1
Total g/m^2	19.7	24.7	23.7	21.0

300 yards off Wild Rose Marina (44 39.900 N, 111 24.408 W)				
	Sample date			
Depth	1-5-2001	1-20-2001	2-8-2001	3-2-2001
Snow depth (mm)	175	75	50 (wind)	125
Ice thickness (mm)	375	450	500	525
Ice bottom	6.9	11.6	11.0	9.6
1 meter	7.0	11.5	11.0	9.7
2 meter	6.5	10.4	9.2	8.7
3 meter	4.2	6.2	5.0	5.2
4 meter	3.0	3.5	2.1	3.5
5 meter	2.7	0.8	0.7	1.4
Sum 2-5 meters	16.4	20.9	17.0	18.7
Average ice 1-meter	6.9	11.5	11.0	9.7
Total g/m^2	23.4	36.8	30.8	33.2

Appendix B. Continued.

Middle of Outlet Bay (44 36 176 N, 111 22 049W)				
	Sample date			
Depth	1-5-2001	1-20-2001	2-8-2001	3-2-2001
Snow depth (mm)	75	7	7	15
Ice thickness (mm)	13	18	22	22
Ice bottom	6.4	11.2	9.6	10.2
1 meter	6.8	10.8	8.7	9.8
2 meter	4.0	3.5	4.5	1.3
3 meter	2.5	2.8	2.5	3.1
4 meter	N/A	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	6.5	6.3	7.0	4.4
Average ice 1-meter	6.6	11.0	9.1	10.0
Total g/m^2	13.1	17.3	16.1	14.4

Appendix C. Results from dissolved oxygen monitoring (mg/l), August through October 2001, Henrys Lake, Idaho.

One mile south of Pittsburgh Creek (44 38.836 N, 111 23.118 W)				
	Sample date			
Depth	8-17-2001	9-17-2001	10-12-2001	10-17-2001
Surface	8.1	6.5	6.9	7.1
1 meter	8.1	6.5	6.9	7.1
2 meter	8.1	6.5	6.9	7.2
3 meter	8	6.5	7.0	7.3
4 meter	6	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	22.1	13.0	13.9	14.5
Average 1-meter	8.1	6.5	6.9	7.1
Total g/m^2	30.2	19.5	20.7	21.2

300 meters off County Boat Dock (44 39.039 N, 111 25.935 W)				
	Sample Date			
Depth	8-17-2001	9-17-2001	10-12-2001	10-17-2001
Surface	8.0	5.0	8.5	7.3
1 meter	8.0	4.8	8.5	7.3
2 meter	8.3	4.0	9.1	7.3
3 meter	N/A	N/A	5.2	7.5
4 meter	N/A	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	8.3	4.0	14.4	14.8
Average 1-meter	8.0	4.9	8.5	7.3
Total g/m^2	16.3	8.9	22.9	22.1

300 Meters off Wild Rose Marina (44 39.900 N, 111 24.408 W)				
	Sample date			
Depth	8-17-2001	9-17-2001	10-12-2001	10-17-2001
Surface	7.7	6.1	7.6	7.3
1 meter	7.7	6.1	7.4	7.1
2 meter	4.6	6.1	7.5	7.1
3 meter	7.6	6.0	7.2	7.0
4 meter	N/A	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	12.2	12.1	14.7	14.1
Average 1-meter	7.7	6.1	7.5	7.2
Total g/m^2	19.9	18.2	22.2	21.3

Appendix C. Continued.

	Cliffs (44 370.270 N, 111 24.903 W)			
	Sample date			
Depth	8-17-2001	9-17-2001	10-12-2001	10-17-2001
Surface	8.6	6.0	7.1	7.1
1 meter	8.6	6.0	7.1	7.2
2 meter	8.5	5.9	7.2	7.0
3 meter	7.7	N/A	N/A	7.3
4 meter	N/A	N/A	N/A	N/A
5 meter	N/A	N/A	N/A	N/A
Sum 2-5 meters	16.2	5.9	7.2	14.4
Average 1 meter	8.6	6.0	7.1	7.2
Total g/m^2	24.8	11.9	14.3	21.5

Appendix D. GPS coordinates for Island Park Reservoir standard gill net locations.

Location	Coordinates (UTM)
Bills Island	12T 0465499 UTM 4919897
Brush Pile	12T 0469648 UTM 4919391
Mill Creek	12T 0466325 UTM 4921491
Trudes Bay	12T 0458721 UTM 4917667
Goose Island	12T 0457126 UTM 4916809
Goose Box 25	12T 0459548 UTM 4915592
Goose Box 56	12T 0460759 UTM 4916403

2001 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-26

Project: I-Surveys and Inventories | Subproject: I-G Upper Snake Region

Job No.: c-1 | Title: Rivers and Streams Investigations

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

Electrofishing surveys were conducted on Birch Creek, Medicine Lodge Creek and Little Lost River as well as the Mack's Inn and Coffee Pot rapids sections of the Henrys Fork of the Snake River to detect the presence of whirling disease *Myxobolus cerebralis*. Sampling consisted of single-pass backpack electrofishing on Birch Creek, Medicine Lodge Creek and Little Lost River to collect a target of 60-65 fish for analysis. Henrys Fork sampling was conducted by a private group. Fish were sent to the Eagle Fish Health Laboratory for analysis. Results indicated the presence of *M. cerebralis* in the Little Lost River, Birch Creek and Medicine Lodge Creek as well as both sections of the Henrys Fork.

The Stone Bridge section of the Henrys Fork was also sampled to assess the potential impacts of whirling disease, which has been documented in this area. Sampling consisted of a single electrofishing run with two boats running concurrently. All fish encountered were identified, weighed and measured before being released. Length frequencies were compared to previous years' samples. Statistical analysis indicated a difference in length frequencies between sample years; however, no missing year classes were identifiable based on observations of length frequencies. Therefore, based on this limited information, impacts of whirling disease on the trout population in this reach of the Henrys Fork appear to be minimal.

Six thermographs were placed in the Willow Creek drainage to evaluate summer trout habitat in these areas. Thermographs were placed in Willow Creek at Clowards Crossing, Grays Lake outlet confluence, High Bridge and Pole Bridge, and in the Grays Lake outlet at Willow Creek confluence and Outlet Ridge Bridge. Thermographs were in operation from mid-July through October and recorded temperatures greater than 20^{o}C in all locations.

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OBJECTIVE

To obtain current information for fishery management decisions on rivers and streams, including angler use and success, harvest and opinions, fish population characteristics, spawning success, habitat characteristics, return-to-the-creel for hatchery trout, and to develop appropriate management recommendations.

METHODS

Disease Testing

Backpack electrofishing units were used to collect fish in four sections of Medicine Lodge Creek (July 27), one section of Birch Creek (June 6 and 26) and two sections of the Little Lost River (June 6). Appendix A shows GPS coordinates of sample locations, where available. Sampling focused on smaller (age 0-1) fish, although larger fish were collected. Attempts were made to collect sixty fish from each water body. Single passes were made, and all fish collected were measured and either sacrificed for testing or released. Disease samples were collected in the Mack's Inn/Coffee Pot Rapids section (upper section) of the Henrys Fork by a private group. Testing was conducted by the Eagle Fish Health Laboratory on five-fish pooled samples. Thirteen pooled samples were tested from Medicine Lodge Creek, 14 pooled samples from Birch Creek, 13 pooled samples from the Little Lost River and seven pooled samples from the upper Henrys Fork. Pooled samples were considered positive for whirling disease if either *M. cerebralis* or *Myxobolus* spores were detected in the samples.

Stone Bridge

Two drift boat electrofishers were used to collect trout from the Stone Bridge section of the Henrys Fork Snake River on August 24, 2001. A single pass was used with all trout encountered being collected, measured and released. Length frequencies were created to describe the population in this section of the river and were compared to previous years' length frequencies to detect changes over time. Statistical analysis (differences in length frequencies) was conducted using a Kolmogorov-Smirnov test.

Willow Creek Drainage

Six thermographs were placed throughout the Willow Creek Drainage on July 15, and retrieved at the beginning of October. Thermographs were anchored to the bottom of the stream using a cable and heavy weight capable of withstanding high flows. Data were recorded hourly throughout the time they remained in the streams. Results were analyzed to determine thermal suitability of the drainage for trout.

RESULTS

Disease Testing

Pooled fish samples obtained from Medicine Lodge Creek tested positive for *M. cerebralis* in 12 of 12 samples sent for analysis. The one histology sample tested for whirling disease was also positive. Additionally, other undefined neurotropic *Myxobolus* species were detected in these samples.

Rainbow trout *Oncorhynchus mykiss* in Birch Creek also tested positive for *M. cerebralis* (13 of 13 samples) and other *Myxobolus* species as well as histo-verified whirling disease in one of five samples. Non-*cerebralis* spores were found in both nervous and connective tissues of tested trout.

Rainbow trout collected in the Little Lost River tested positive for whirling disease in 5 of 13 pooled samples of fish. Only *M. cerebralis* was detected in these samples. Trout from this drainage first tested positive for whirling disease in 1995.

Fish samples obtained from the Mack's Inn/Coffee Pot Rapids section of the Henrys Fork also tested positive for *M. cerebralis* in two of seven pooled samples. Whirling disease has been previously documented in the Henrys Fork but not from this particular reach.

Stone Bridge

A total of 284 rainbow trout and 22 brown trout *Salmo trutta* were collected during the current electrofishing survey. Rainbow trout ranged in size from 50 to 450 mm (mean of 214 mm); brown trout ranged from 110 mm to 500 mm (mean 279 mm). Based on analysis of length frequency distributions, no missing year classes were noticed. However, analysis using Kolmogorov-Smirnov test indicated a difference between length frequencies for 1997 and 2001 ($p < 0.001$). Most notable between these samples is the greater abundance of fish less than 150 mm (assumed to be age-0) in the 2001 sample when compared to the same size class in the 1997 sample (Figures 1 and 2).

Willow Creek Drainage

All six thermographs placed in the Willow Creek drainage recorded maximum daily temperatures greater than 20^0C from mid-July to August. Results from these thermographs are presented in Figures 3-6.

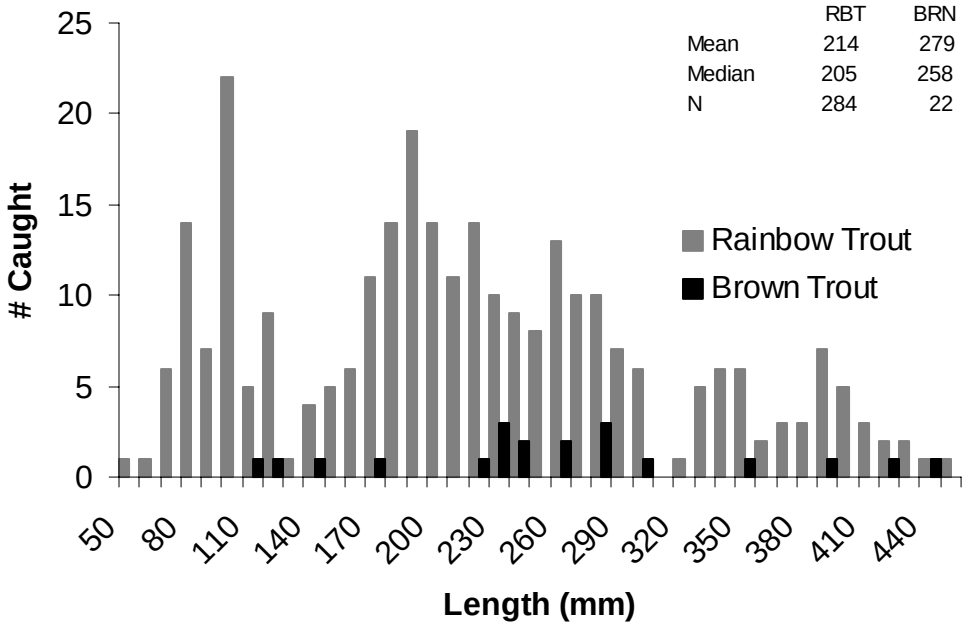


Figure 1. Length frequency distribution for rainbow and brown trout captured electrofishing in the Stone Bridge section of the Henrys Fork Snake River, Idaho, August 24, 2001.

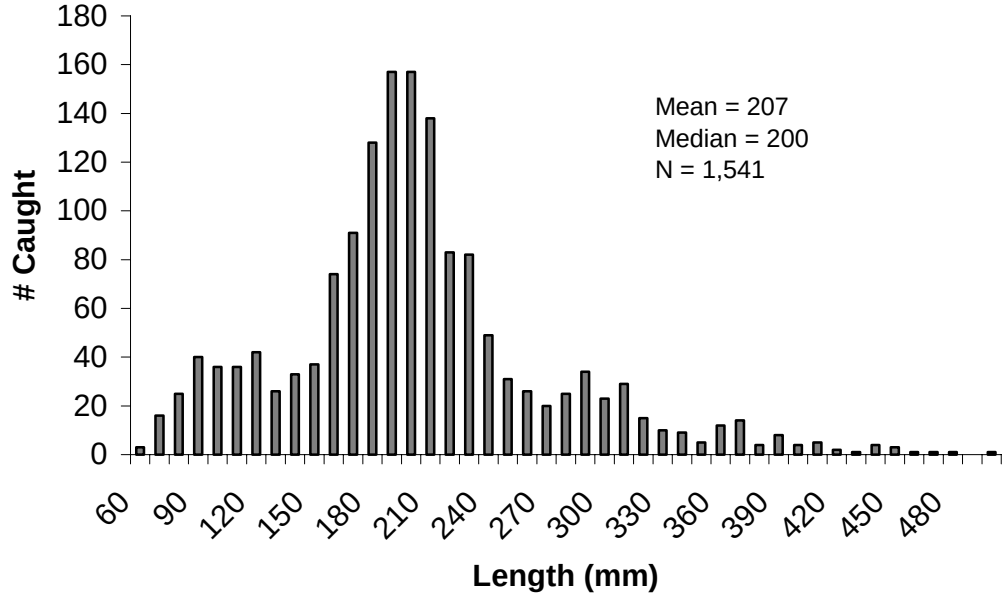
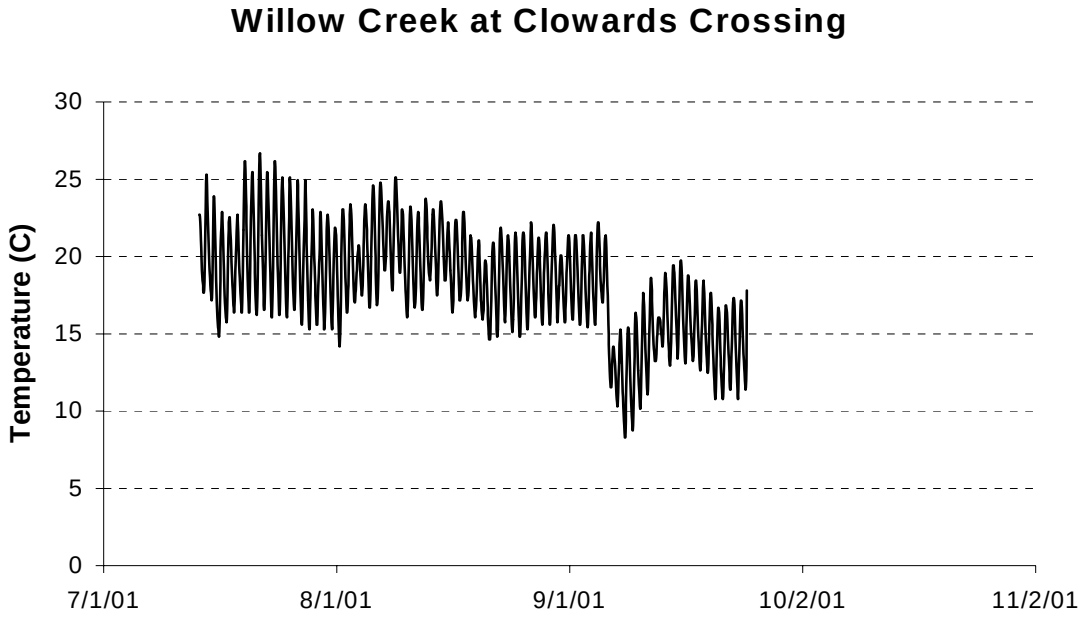


Figure 2. Length frequency distribution for rainbow trout captured electrofishing in the Stone Bridge section of the Henrys Fork Snake River, Idaho, September 8, 1997.



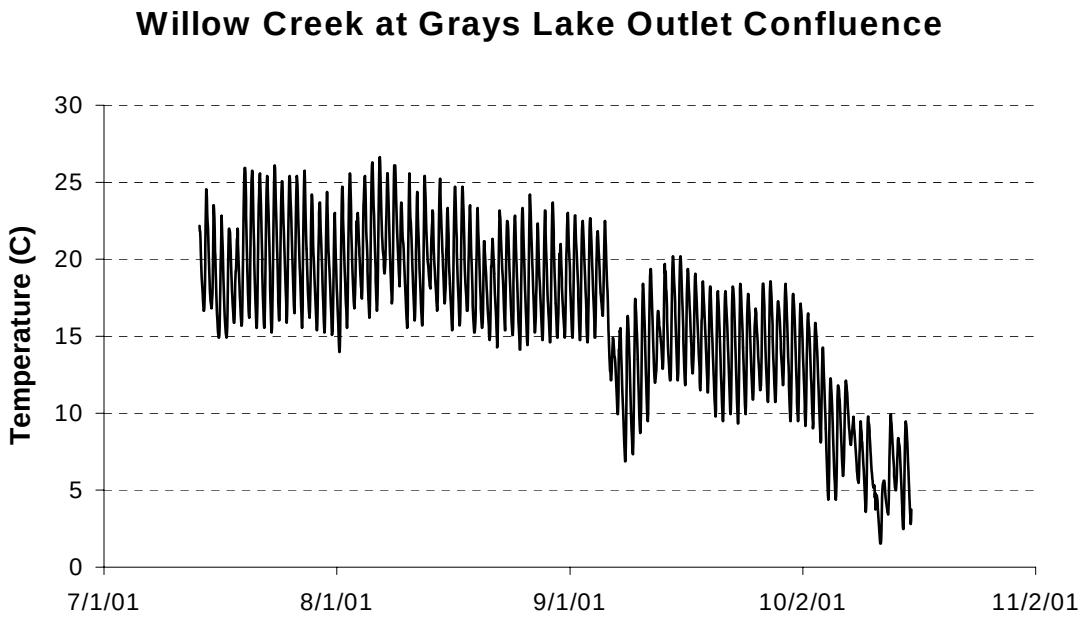


Figure 3. Hourly water temperatures recorded in Willow Creek at Clowards Crossing and Grays Lake Outlet confluence, 2001.

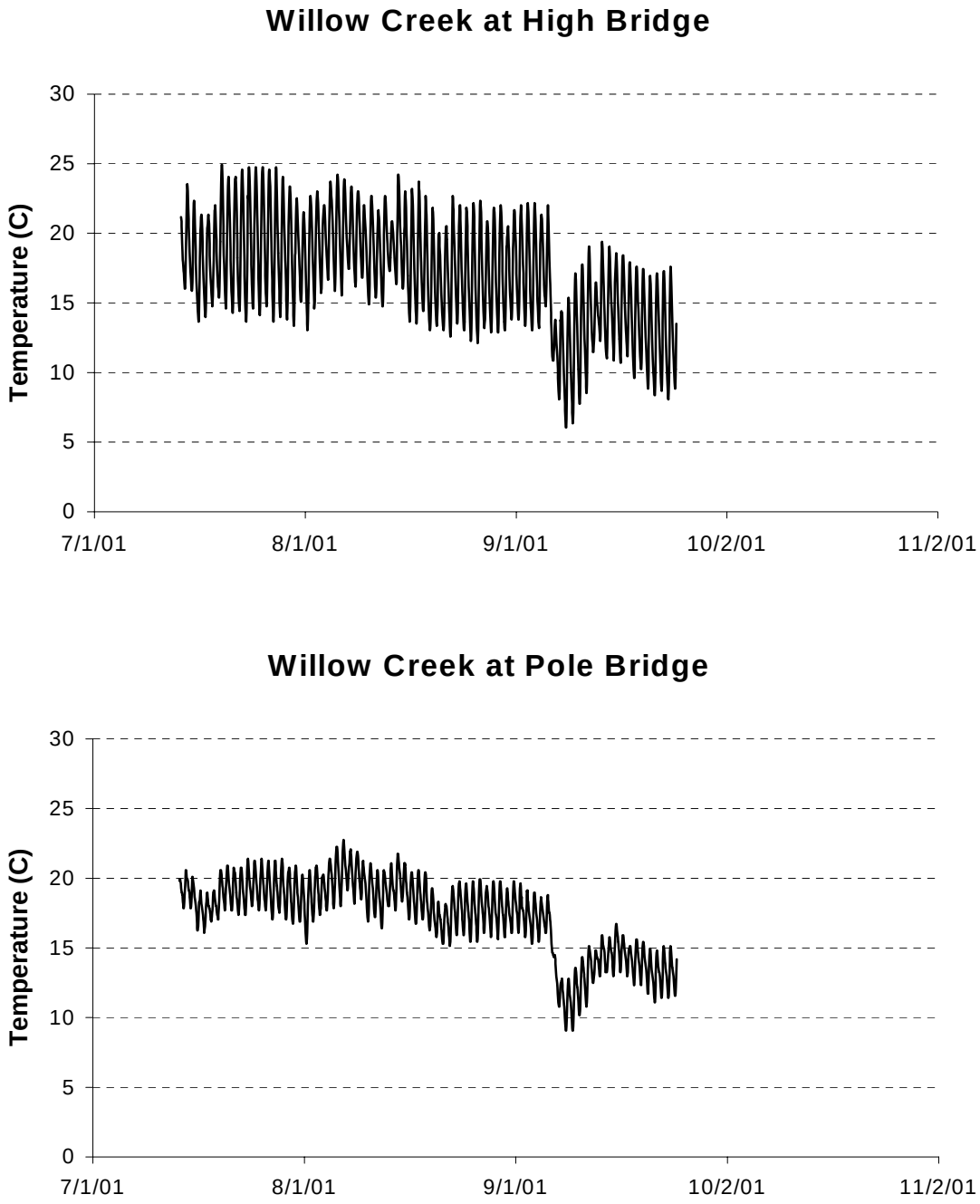


Figure 4. Hourly water temperatures recorded in Willow Creek at High Bridge and Pole Bridge, 2001.

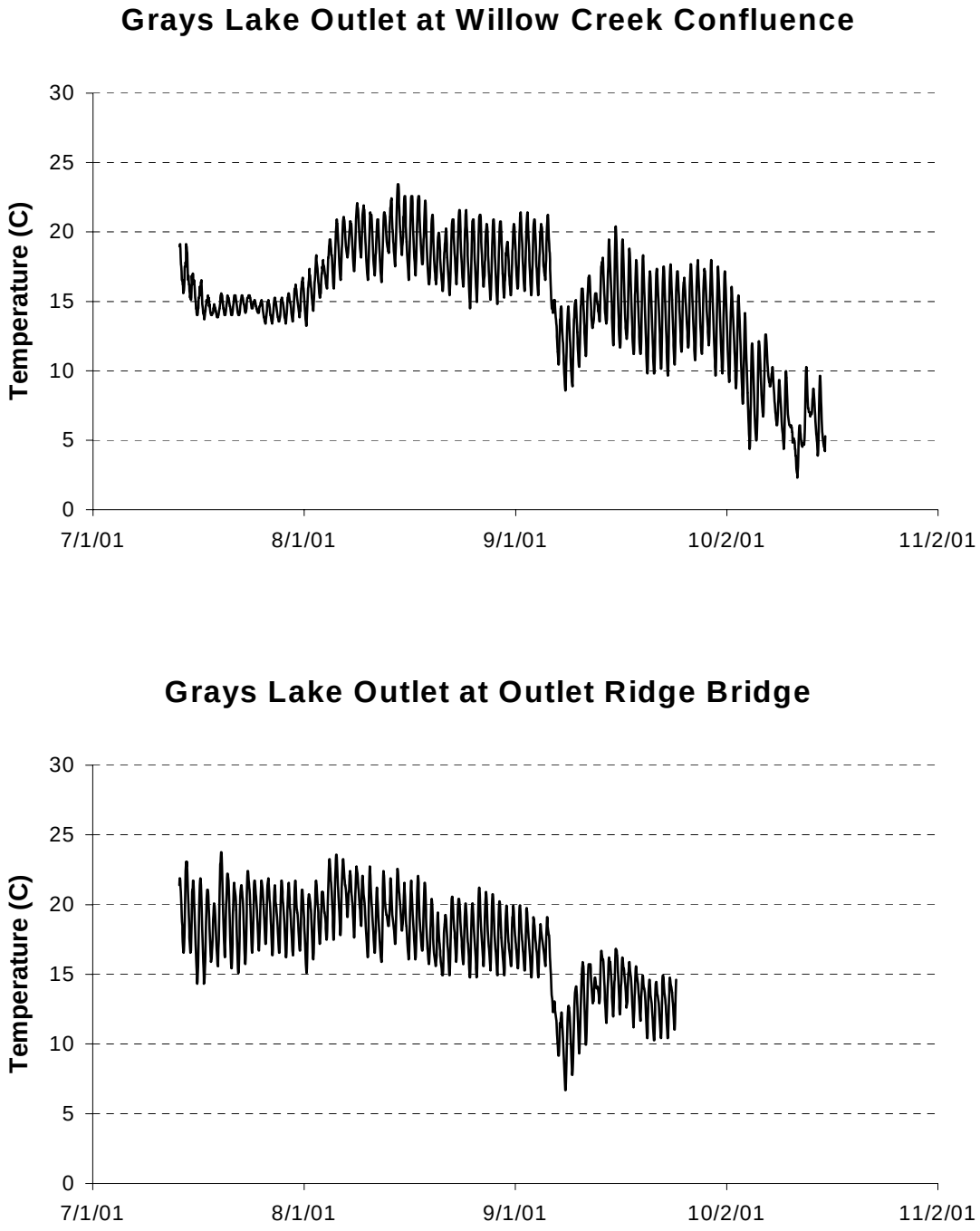


Figure 5. Hourly water temperatures recorded in Grays Lake Outlet at Willow Creek confluence and Outlet Ridge bridge, 2001.

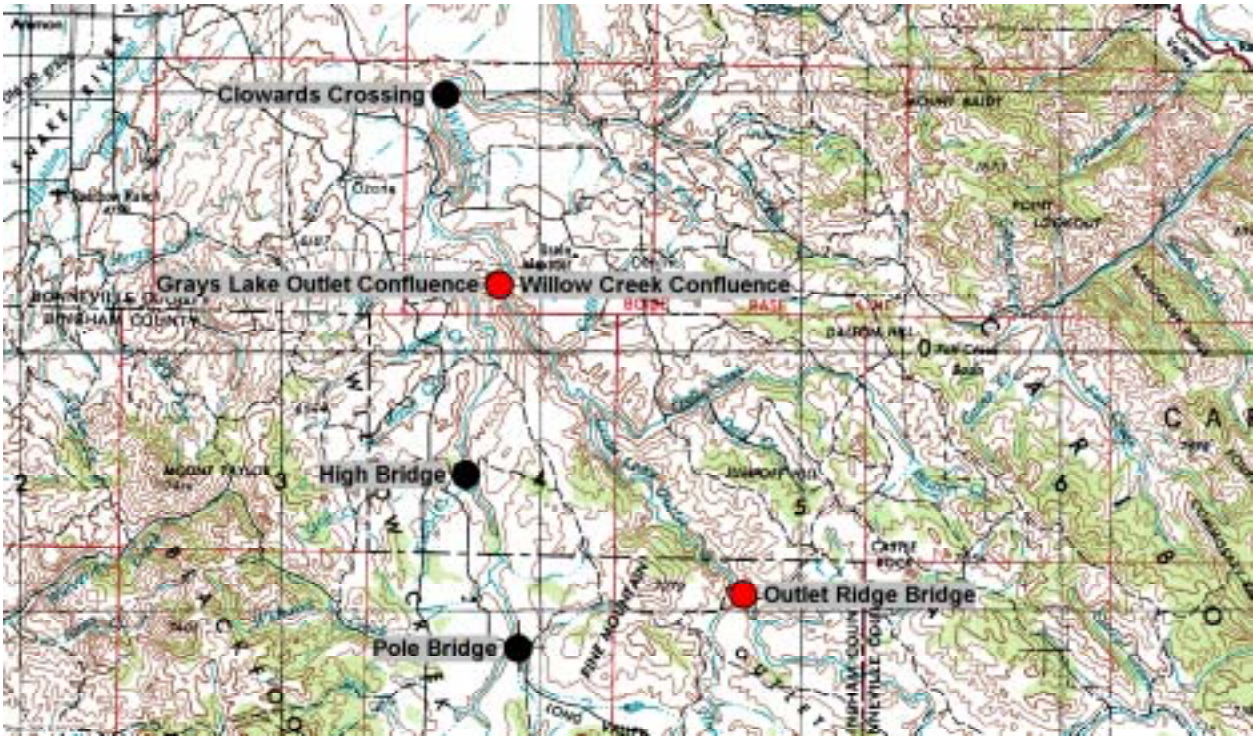


Figure 6. Location of temperature loggers in Willow Creek and Grays Lake Outlet, 2001.

DISCUSSION

Sinks Drainages

The presence of whirling disease and *Myxobolus* spp. in the sinks drainages is not unexpected. Whirling disease was previously documented in the Little Lost River in 1995. However, the presence of these pathogens in Birch Creek and Medicine Lodge Creek has not been previously documented. The current sampling presumably documents the existing distribution of whirling disease and not necessarily a spread of this disease. Future work in these drainages should focus on characterizing the age structure of the populations to assess potential impacts of whirling disease found here.

Stone Bridge

Size distributions in the Stone Bridge reach of the Henrys Fork reflect healthy populations of trout with strong year classes of young fish and fair numbers of older, adult fish. Statistical differences detected between 1997 and 2001 length frequency distributions are likely the result of higher catch rates of fish <150 mm in the 2001 sample when compared to the 1997 sample. These differences may represent variability in year class strength in this reach of the river. Additional analysis on this and other sections of the Henrys Fork should focus on year class strength and fluctuation and should give insight into possible impacts of whirling disease in this system.

RECOMMENDATIONS

1. Disease Testing – Conduct age and growth analysis in watersheds testing positive for *Myxobolus* to assess potential impacts of whirling disease.

2. Stone Bridge – Incorporate intensive system-wide analysis of existing fish populations to include age and growth analysis in order to correlate year class fluctuations to environmental and biologic causes.

Willow Creek Drainage

Although maximum daily temperatures exceeded levels considered stressful for trout survival, minimum daily temperatures were typically below this threshold and likely allow trout to persist. This drainage is historically noted as harboring significant trout densities. However, decades of cattle grazing and other land abuses have left the riparian zone altered from historical conditions. Deteriorated habitat combined with recent low snowpacks and streamflows appear to be affecting trout abundance. Although trout are still present in this drainage, densities are likely impacted by these changes.

Recommendations

1. As time permits, conduct population estimates on this drainage in areas previously sampled.

2. Educate and work with landowners in this drainage to reduce impacts of grazing along riparian areas.

APPENDICES

Appendix A. Locations used for whirling disease samples in the Sinks drainage, 2001. All locations are given in Lat/Long and are starting points for the samples. All sampling continued from these points in an upstream direction.

Little Lost River:

Site 1.	N 44.1444	W 13.2427
Site 2.	N 44.2345	W 113.3531

Birch Creek:

Site 1.	N 44.065	W 112.868

Medicine Lodge Creek:

Site 1.	N 44.2731	W 112.4281
Site 2.	N 44.2768	W 112.4580
Site 3.	N 44.2877	W 112.4919
Site 4.	N 44.3176	W 112.5548

2001 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-26

Project I: Surveys and Inventories | Subproject I-G: Upper Snake Region

Job: c-2 - South Fork Snake River | Title: Rivers and Streams Investigations

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

In the South Fork Snake River, a total of 1,338 trout were captured during two days of electrofishing at the Conant section in October 2001. Trout species composition and relative abundance were cutthroat trout *Oncorhynchus clarki* (58%), rainbow trout *O. mykiss*, hybrid rainbow X cutthroat trout (25%), and brown trout *Salmo trutta* (16%). No lake trout *Salvelinus namaycush* or kokanee *O. nerka kennerlyi* were caught. Cutthroat trout relative abundance was the second lowest since records began in 1982, whereas rainbow and hybrid trout relative abundance was the second highest on record. Brown trout relative abundance has varied from 7% to 21% since 1982, and there is no apparent trend.

Mean total length was 312 mm for cutthroat trout, 304 mm for rainbow and hybrid trout, 311 mm for brown trout, and 310 mm for all species combined. Quality stock density (QSD) was 1.8 for cutthroat trout, 16.9 for rainbow and hybrid trout, 17.6 for brown trout, and 8.2 for all species combined. Cutthroat trout QSD has declined to the lowest on record, reflecting fewer fish ≥406 mm. No recapture run was conducted because of low flows.

Trout Unlimited volunteers helped salvage approximately 1,048 fish in the dewatered south channel at Twin Bridges on October 27 and 117 fish in the Heise side channel on November 20, 2001. Most fish at Twin Bridges were brown trout (236), followed by cutthroat trout (86), mountain whitefish *Prosopium williamsoni* (84), and juvenile fish of these taxa (642). An additional seven rainbow and hybrid trout were removed. Cutthroat and brown trout were salvaged at Heise.

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INTRODUCTION AND STUDY AREA

Trout populations in the South Fork Snake River have been monitored annually using electrofishing since 1986. Four river sections have been electrofished (Figure 1): Palisades (5.0 km), Conant (4.9 km), Twin Bridges (2.9 km), and Lorenzo (4.8 km). However, only the Conant section has been sampled every year, a portion of which was sampled in 1982 as well (Moore and Schill 1984). The last creel census was conducted in 1996 (Schrader et al. 2003).

Special regulations restricting harvest of cutthroat trout *Oncorhynchus clarki* were enacted upstream of the Heise measuring cable to Irwin in 1984 and extended to Palisades Dam in 1988 (Appendix A). Based on this success, the restricted cutthroat trout harvest regulation was implemented throughout eastern Idaho in 1990 and included the lower South Fork (below Heise) and all South Fork tributaries. The two fish, none between 8-16 inches, regulation was extended to all trout species in the mainstem (but not tributaries) in 1992. Emergency changes in 1999 removed rainbow trout *O. mykiss* (and later hybrid trout *O. clarki x mykiss*) from special regulations, returning them to the general six fish bag limit with no size restrictions. The minimum size restriction (8 inches) for cutthroat and brown trout *Salmo trutta* was eliminated in 2000. The lower river (below the Heise cable) is open year round to fishing, whereas the upper river is closed December 1 to Memorial Day weekend (Figure 1).

OBJECTIVES

To obtain current information for fishery management decisions on rivers and streams, including angler use and success, harvest and opinions, fish population characteristics, spawning success, habitat characteristics, return-to-the-creel for hatchery trout, and to develop appropriate management recommendations. Specific objectives related to the South Fork of the Snake River were to:

1. Monitor South Fork Snake River trout populations by electrofishing.

2. Summarize trout species composition, relative abundance, size structure, average fish length, quality stock density (QSD), and density.

METHODS

Mainstem Electrofishing

During 2001, the Conant section was electrofished on October 4 and 5 (Figure 1). We did not conduct recapture runs due to foul weather and low flows (46.1 m^3/s or 1,630 ft^3/s on October 15).

Fish were captured using direct-current (DC) electrofishing gear (Coffelt VVP-15 powered by a Honda 5000 W generator) mounted in an 18-foot Alumaweld sled with a 150 hp outboard jet. We used pulsed DC current through two boom-and-dangler anodes fixed to the bow while driving downstream. The boat hull was the cathode. The VVP settings were at 200V,

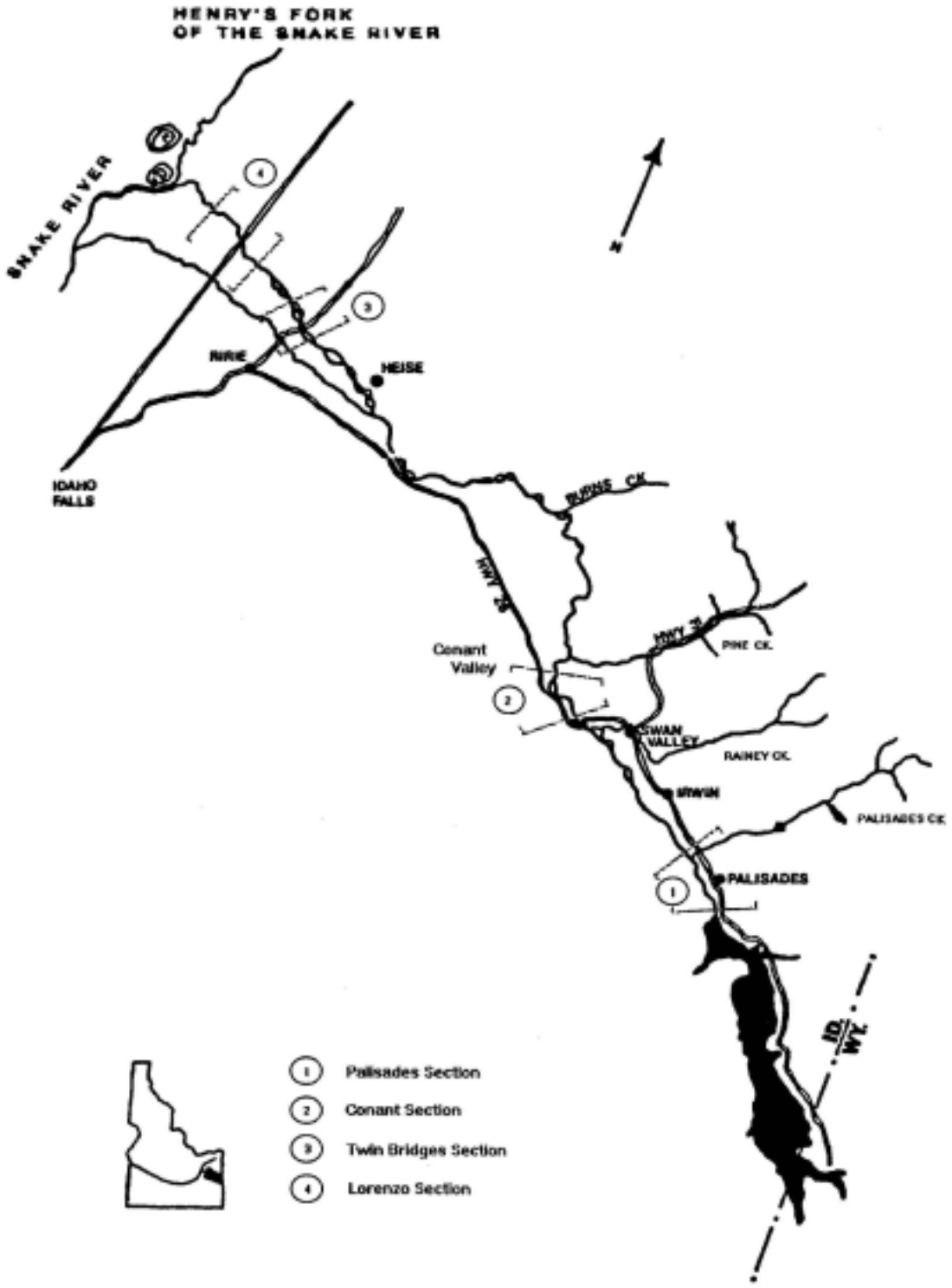

Figure 1. Map of South Fork Snake River showing electrofishing sections.

3-5 A, 20% pulse width, and 60 Hz (pulses per second). Flows varied from 117.2 to 117.5 m^3/s (4,140 to 4,150 ft^3/s) at the Irwin gage (USGS, provisional data; Appendix B).

We attempted to capture all species and sizes of trout. Fish were anesthetized, identified, and measured to the nearest millimeter for total length (TL). Otoliths were collected from incidental fish mortalities. Brown trout less than 150 mm and all other species less than 100 mm (approximately age-0) were not marked; age-1 and older fish were marked with a caudal fin punch and then released.

Electrofishing data were entered and analyzed using the computer program Mark Recapture 5.0 (MR5; Montana Department of Fish, Wildlife, and Parks 1994). General statistical analysis was conducted according to Zar (1984).

We assumed capture probabilities did not vary with species, and relative abundance was estimated using proportions of all individual trout captured (excluding recaptures). Although capture probabilities vary with fish length (Schill 1992), population size structures (length frequency distributions) and average fish lengths were estimated using all sizes of individual fish captured. Quality stock density was estimated using the number of individual fish captured $\geq$406 mm divided by the number $\geq$203 mm, times 100. Density was estimated using two methods in the MR5 computer program. The log-likelihood method was preferred over the modified Peterson method if modeled efficiency curves were acceptable (termcode=1 and at least one of two chi-square p-values>0.05).

Fish Salvage

Low flows in the lower river (below Heise) during late fall typically strand fish in dewatered side channels. Trout Unlimited volunteers and regional fisheries staff salvaged the Twin Bridges south channel on October 27 and the Heise side channel on November 20, 2001. Work crews used backpack electrofishing gear to capture most stranded game fish. Fish were identified, counted, and hauled to and released in the mainstem. No other data were recorded.

RESULTS

Mainstem Electrofishing

Conant

A total of 1,338 trout were captured during two days of electrofishing in October 2001. Species composition and relative abundance were cutthroat trout (58%), rainbow and hybrid trout (25%), and brown trout (16%; Figure 2, Appendix C). Less than 1% of the cutthroat trout captured were of hatchery origin. No lake trout *Salvelinus namaycush* or kokanee *O. nerka kennerlyi* were captured.

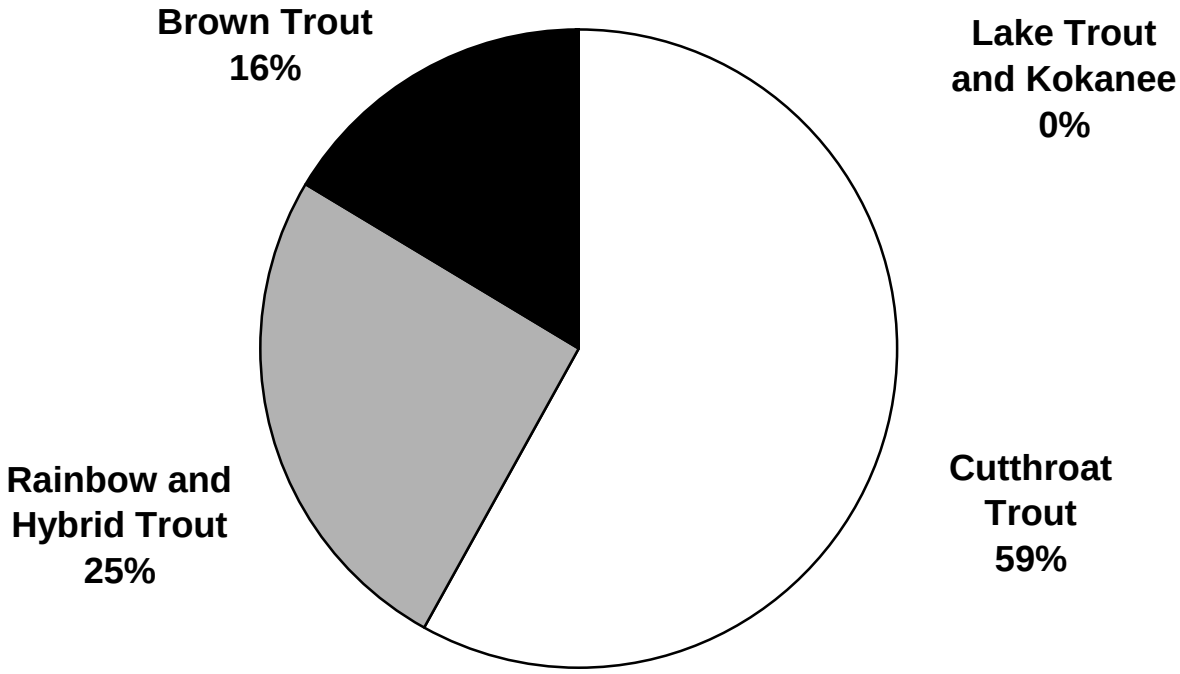

Figure 2. Trout species composition and relative abundance (%) at the Conant electrofishing section, South Fork Snake River, 2001. Total individual fish captured during mark and recapture runs=1,338. Results are from the MR5 database for all sizes of fish.

The cutthroat trout length frequency distribution shows strong groups of age-1 fish (152 to 254 mm) and age-2 and older fish (>254 mm; Figure 3). Likewise, strong groups of juvenile rainbow and hybrid trout (Figure 4) and brown trout (Figure 5) are apparent. Ages were approximated from these frequency distributions and not validated.

Mean total length (TL) of cutthroat trout was 312 mm (n=778), 304 mm for rainbow and hybrid trout (n=341), 311 mm for brown trout (n=219), and 310 mm for all species combined (n=1,338; Appendix D). Quality stock density was 1.8 for cutthroat trout, 16.9 for rainbow and hybrid trout, 17.6 for brown trout, and 8.2 for all species combined.

Fish Salvage

At the Twin Bridges south channel, work crews salvaged approximately 1,048 game fish. Most fish were brown trout (236), followed by cutthroat trout (86), mountain whitefish *Prosopium williamsoni* (84), and juvenile fish of these taxa (642). An additional seven rainbow and hybrid trout were killed. At the Heise side channel, work crews salvaged approximately 117 cutthroat and brown trout combined.

DISCUSSION

The proportion of cutthroat trout captured by electrofishing in 2001 (58%) is second lowest on record, only four percentage points higher than 1997 (54%), and continues the downward trend observed since 1989 (89%; Figure 6). In contrast, the proportion of rainbow and hybrid trout in 2001 (25%) is second highest on record, only two points lower than 1997 (27%), and continues the upward trend observed since 1989 (4%). These trends continue to be the major threat to the genetic integrity and long-term viability of cutthroat trout populations in the South Fork. Further, liberalized rainbow and hybrid trout harvest regulations implemented in 1999 and 2000 have yet to reverse these trends. More education and outreach efforts are needed to encourage anglers to harvest rainbow and hybrid trout.

The proportion of brown trout captured by electrofishing has varied from 7 to 21% since 1982 (Figure 6). There is no apparent trend.

Because the 1982, 1986, and 1987 electrofishing efforts were conducted in November rather than in October and the section was shortened in 1982 and 1987 resulting in smaller sample sizes, comparability of data from these years is somewhat limited (Appendices B to I). Similarly, the 1997 data may be confounded by significant habitat changes that occurred with near-record runoff of 1,274.4 m^3/s (45,000 ft^3/s).

Cutthroat trout QSD in 2001 (1.8) was the lowest on record, reflecting fewer large ($\geq$406 mm) fish (Figure 7). Only 16 cutthroat trout $\geq$406 mm were captured during 2001, compared to 104 in 1994 (Figure 8). We chose 1994 for comparison as electrofishing effort was identical (only two marking runs), sample size was similar (n=867), and QSD was representative of the early 1990s (9-15).

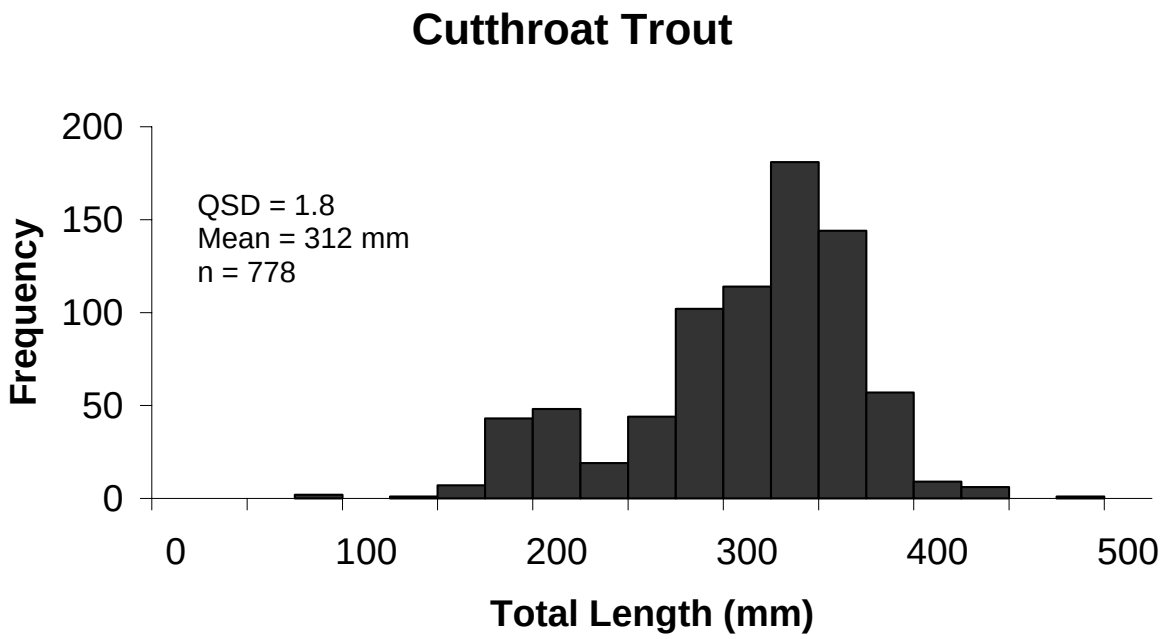

Figure 3. Length frequency distribution of cutthroat trout captured at the Conant electrofishing section, South Fork Snake River, 2001.

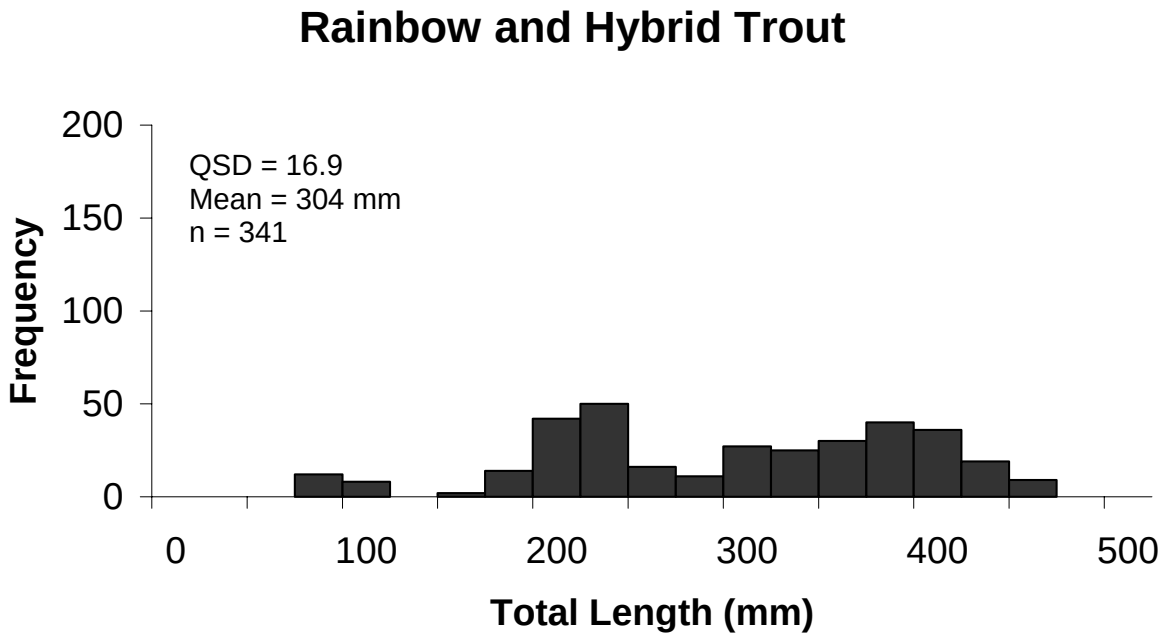

Figure 4. Length frequency distribution of rainbow and hybrid trout captured at the Conant electrofishing section, South Fork Snake River, 2001.

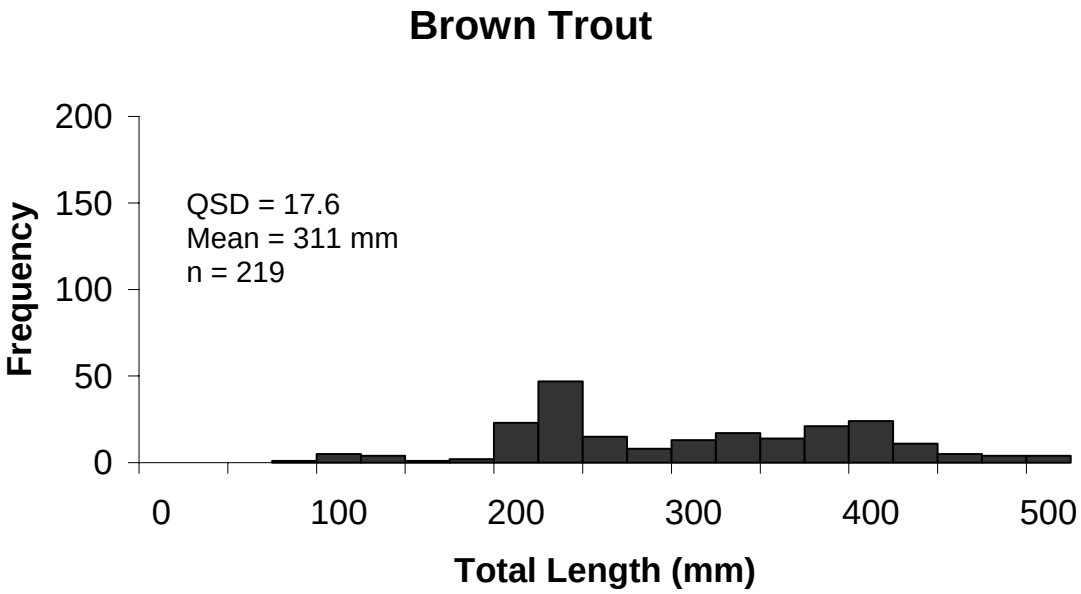

Figure 5. Length frequency distribution of brown trout captured at the Conant electrofishing section, South Fork Snake River, 2001.

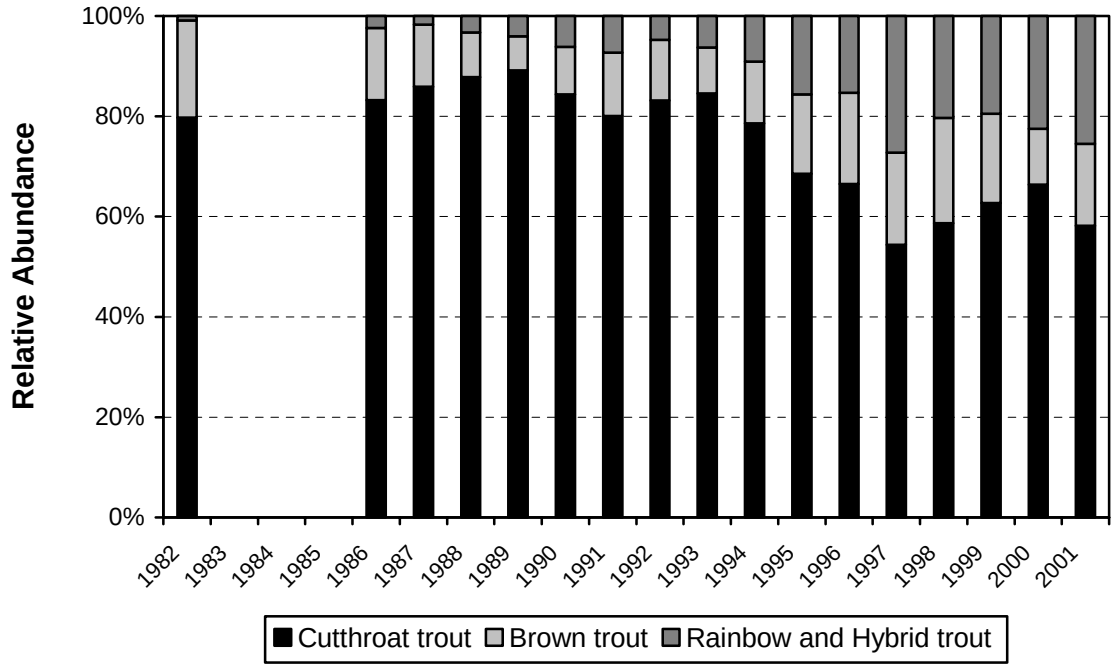

Figure 6. Trout relative abundance trends at the Conant electrofishing section, South Fork Snake River, 1982 to 2001. Results are from MR5 database for all sizes of fish except for 1982, which is from Moore and Schill (1984).

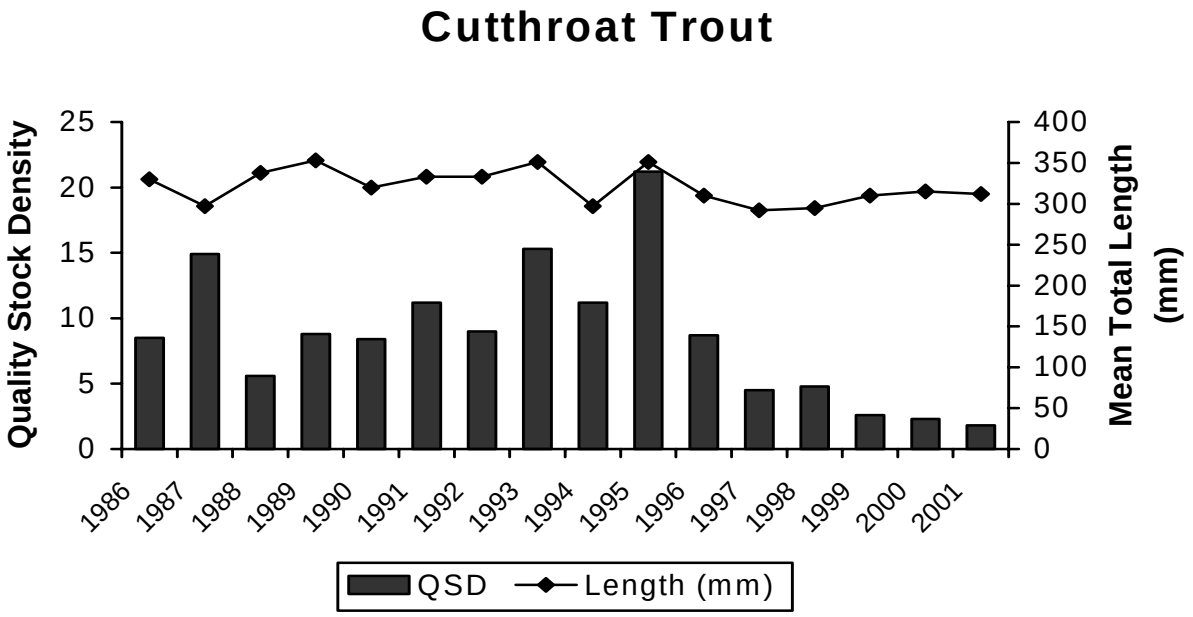

Figure 7. Cutthroat trout quality stock density (QSD) and mean total length trends at the Conant electrofishing section, South Fork Snake River, 1986 to 2001. Results are from MR5 database for all sizes of fish.

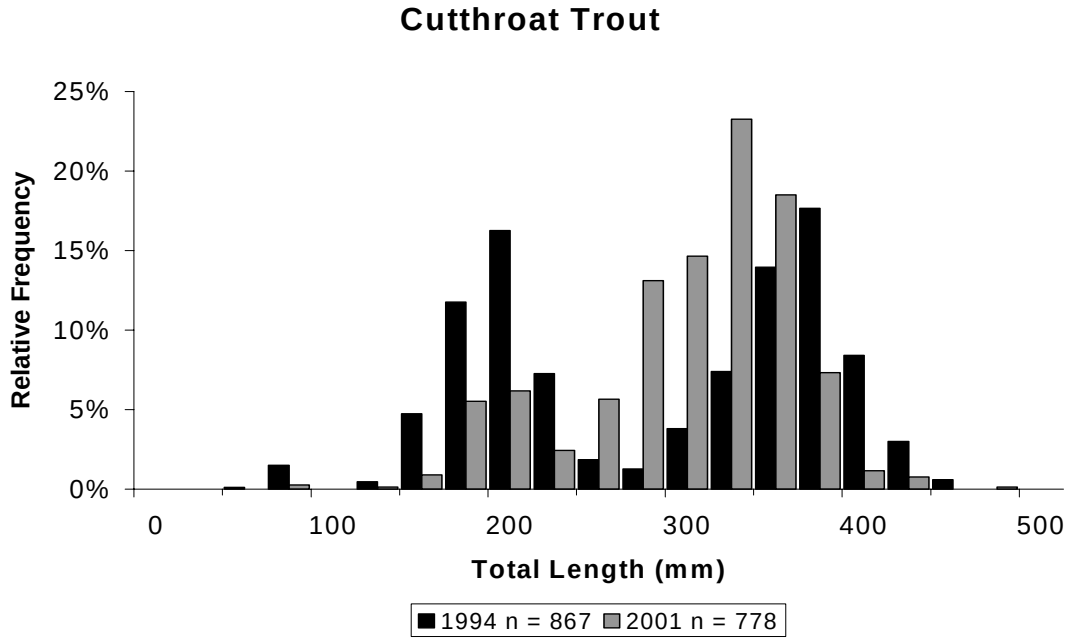

Figure 8. Comparison of cutthroat trout relative length frequency distributions for the Conant electrofishing section, South Fork Snake River, 1994 and 2001.

RECOMMENDATIONS

1. Continue monitoring South Fork Snake River trout populations by electrofishing.

2. Develop length-weight regressions for each trout species using electrofishing data collected in 1994 and 1995. Predict fish weights from measured lengths and estimate biomass and standing crops for all sections and years.

3. Inform and educate anglers regarding the value of harvesting rainbow and hybrid trout to conserve cutthroat trout.

4. Conduct a fully randomized creel survey to estimate angler effort, catch and harvest rates, and total catch and harvest throughout the South Fork Snake River.

5. Conduct a reward-tagging study to estimate annual exploitation rates.

ACKNOWLEDGMENTS

Lauri Hanauska-Brown helped with electrofishing. L.D. "Buck" Goodrich, Trout Unlimited organized and numerous volunteers helped with the side channel salvage.

LITERATURE CITED

Montana Department of Fish, Wildlife, and Parks. 1994. MARKRECAPTURE Version 4.0: A software package for fishery population estimates. Montana Department of Fish, Wildlife, and Parks, Helena.

Moore, V., and D. Schill. 1984. South Fork Snake River fisheries investigations. Idaho Department of Fish and Game, Job Completion Report, Project F-73-R-5, Boise.

Ricker, W.E. 1975. Computation and interpretation of biological statistics of fish populations. Fisheries Research Board of Canada, Bulletin 191, Ottawa.

Schill, D.J. 1992. Statewide data summary. Wild trout investigations. Idaho Department of Fish and Game, Job Performance Report, Project F-73-R-13, Boise.

Schrader, W.C., J. Dillon, and M. Gamblin. (2003). Regional fisheries management investigations. Idaho Department of Fish and Game, 1996 Job Performance Report, Project F-71-R-21, Boise.

Zar, J.H. 1984. Biostatistical analysis, 2nd edition. Prentice-Hall, Inc., Englewood Cliffs, New Jersey.

APPENDICES

Appendix A. South Fork Snake River fishing regulations 1970-2001.

Year	Season	Trout bag & size limit	Special
1970	May 30 - Nov 30	7 lb. + 1 fish, not to exceed 15 fish	Whitefish open 3/1 to 4/30 Irwin to Dam; Mouth to Heise cable open all year
1971	May 29 - Nov 30	Same	Same
1972	May 27 - Nov 30	7 lb. + 1 fish, not to exceed 10 fish	Same
1973	May 26 - Nov 30	Same	All species open 3/1 to 9/30 Irwin to Dam; Mouth to Heise cable open all year
1974	May 25 - Nov 30	10 fish, not more than 2 exceeding 14”	Same
1975	May 24 - Nov 30	Same	Same
1976	May 29 - Nov 30	10 fish, not more than 5 exceeding 12”, and not more than 2 exceeding 18”	Same
1977	May 28 - Nov 30	6 fish, only 2 over 16”	Same, except dam tailrace closed
1978	May 27 - Nov 30	Same	Dam tailrace closed; all species open 5/27 to 9/30 Irwin to Dam; Mouth to Heise cable open 5/27 to 12/31
1979	May 26 - Nov 30	Same	Dam tailrace closed; all species open 4/1 to 9/30 Irwin to Dam; Mouth to Heise cable open all year
1980	May 24 - Nov 30	Same	Same
1981	May 23 - Nov 30	Same	Same
1982	May 29 - Nov 30	Same	Same, except open 9/1 to 11/30 within 100 yards of Burns Creek
1983	May 28 - Nov 30	Same	Same
1984	May 26 - Nov 30	Same, except Heise cable to Irwin only 2 CT, none between 10-16”, barbless hooks	Same
1985	May 25 - Nov 30	Same, except added hybrids	Same
1986-1987	May 24/23-Nov 30	Same	Same
1988-1989	May 28/27-Nov 30	6 fish, only 2 over 16”; except Heise cable to Dam only 2 CT or HYB, none between 10-16”	Mouth to Heise cable open all year; open 9/1 - 11/30 within 100 yards of Burns Creek
1990-1991	May 26/25-Nov 30	6 fish (except only 2 CT or HYB, none between 8-16”, on all rivers and streams)	Mouth to Heise cable open all year
1992-1993	May 23/29-Nov 30	2 fish, none between 8-16”	Same
1994-1995	May 28/27-Nov 30	Same	Same
1996-1997	May 25/24-Nov 30	Same	Same
1998	May 23 - Nov 30	Same	Same
1999	May 29 - Nov 30	6 fish (except only 2 CT, HYB, or BRN, none between 8-16”)	Same
2000-2001	May 27/26-Nov 30	6 fish (except only 2 CT or BRN, none under 16”)	Same

Appendix B. Sampling dates, flows, and catch rates at the Conant electrofishing section, South Fork Snake River, 1986-2001. Flows were recorded at the USGS Irwin gage. Catch rate results are from the MR5 database for all sizes of fish.

Sampling dates	Range of flows (m^3/s)	Range of flows (ft^3/s)	Mean flow (m^3/s)	Catch rate (fish/day)[a]
11/4,5, 6, 7,20 1986	100.2-107.0	3,540-3,780	101.7	413
11/5,6 1987[b,c]	24.6-26.6	869-941	25.6	174
10/3,4,11 1988	102.0-105.0	3,600-3,710	103.4	630
10/18,19,27 1989	84.7-86.7	2,990-3,060	86.1	930
10/11,12,18 1990	98.8-104.5	3,490-3,690	100.8	1,292
10/7,8,15 1991	127.2-135.7	4,490-4,790	131.7	741
10/14 1992[b]	60.3	2,130	60.3	719
10/13,14,21,22 1993	74.2-108.2	2,620-3,820	90.9	481
10/7,11,14 1994[b]	34.5-69.1	1,220-2,440	52.4	368
10/5,6,12,13 1995	72.8-115.8	2,570-4,090	93.2	436
10/3,4,10,11 1996	106.5-107.3	3,760-3,790	106.9	472
10/16,17,23,27 1997[d]	69.7-99.1	2,460-3,500	84.4	851
10/7,8,14,15 1998	91.5-126.6	3,230-4,470	109.6	593
10/13,14,20,21 1999	101.1-118.1	3,570-4,170	109.6	763
10/19,26 2000[b]	87.8-95.2	3,100-3,360	91.5	602
10/4,5 2001[b]	117.2-117.5	4,140-4,150	117.4	669

[a] Includes recaptured fish; catch rate = (M+C)/number days sampled.
[b] No recapture runs due to low flows.
[c] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[d] Major habitat changes with spring runoff.

Appendix C. Trout species composition and relative abundance (%) at the Conant electrofishing section, South Fork Snake River, October 1982-2001. Total individual fish captured during mark and recapture runs are in parentheses. Results are from MR5 database for all sizes of fish.

Year	WCT & HCT[a]	WRB & HYB[a]	BRN[a]	LKT[a]	KOK[a]	Total
1982[b,c,d]	79 (181)	1 (2)	19 (44)	1 (2)	0 (0)	100 (229)
1986[c]	83 (1,647)	2 (47)	14 (285)	<1 (4)	0 (0)	99 (1,983)
1987[c,e,f]	86 (299)	2 (6)	12 (43)	0 (0)	0 (0)	100 (348)
1988	88 (1,570)	3 (58)	9 (159)	<1 (1)	0 (0)	100 (1,788)
1989	89 (2,291)	4 (103)	7 (175)	0 (0)	0 (0)	100 (2,569)
1990	84 (2,978)	6 (216)	9 (335)	<1 (4)	0 (0)	99 (3,533)
1991	80 (1,646)	7 (150)	13 (259)	0 (0)	0 (0)	100 (2,055)
1992[e]	83 (598)	5 (34)	12 (87)	0 (0)	0 (0)	100 (719)
1993	85 (1,528)	6 (113)	9 (166)	0 (0)	0 (0)	100 (1,807)
1994[e]	79 (867)	9 (100)	12 (136)	0 (0)	<1 (1)	100 (1,104)
1995	69 (1,121)	16 (256)	16 (258)	0 (0)	0 (0)	101 (1,635)
1996	66 (1,190)	15 (274)	18 (325)	<1 (1)	<1 (1)	99 (1,791)
1997[g]	54 (1,676)	27 (840)	18 (567)	<1 (1)	<1 (2)	99 (3,086)
1998	59 (1,312)	20 (454)	21 (469)	<1 (1)	0 (0)	100 (2,236)
1999	63 (1,803)	19 (560)	18 (513)	0 (0)	0 (0)	100 (2,876)
2000[e]	66 (800)	22 (271)	11 (134)	0 (0)	0 (0)	99 (1,205)
2001[e]	58 (778)	25 (341)	16 (219)	0 (0)	0 (0)	99 (1,338)

[a] WCT=wild cutthroat trout; HCT=hatchery cutthroat trout; WRB=wild rainbow trout; HYB=wild rainbow x cutthroat trout hybrid; BRN=wild brown trout; LKT=lake trout; KOK=kokanee.
[b] Only 1.9 km of larger 4.9 km section was electrofished.
[c] Electrofishing conducted in early November.
[d] From Moore and Schill (1984), not MR5 database.
[e] No recapture runs due to low flows.
[f] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[g] Major habitat changes with spring runoff.

Appendix D. Mean total length and quality stock density (QSD) of wild trout captured at the Conant electrofishing section, South Fork Snake River, October 1986-2001. Total individual fish captured during mark and recapture runs equals n. QSD=(number ≥406 mm/number ≥203 mm) x 100. Results are from MR5 database for all sizes of fish.

Year	WCT & HCT[a]			WRB & HYB[a]			BRN[a]			All[b]		
	n	Mean (mm)	QSD	n	Mean (mm)	QSD	n	Mean (mm)	QSD	n	Mean (mm)	QSD
1986[c]	1,647	330	8.5	47	307	11.4	285	338	29.0	1,983	330	11.5
1987[c,d,e]	299	297	14.9	6	262	0.0	43	249	11.5	348	292	14.3
1988	1,570	338	5.6	58	328	12.3	159	310	22.8	1,788	335	7.3
1989	2,291	353	8.8	103	323	19.6	175	343	38.5	2,569	351	11.2
1990	2,978	320	8.4	216	269	13.3	335	267	20.4	3,533	310	9.7
1991	1,646	333	11.2	150	251	6.6	259	274	14.1	2,055	320	11.3
1992[d]	598	333	9.0	34	282	2.9	87	264	6.6	719	323	8.4
1993	1,528	351	15.3	113	340	18.2	166	330	34.2	1,807	348	17.2
1994[d]	867	297	11.2	100	251	13.4	136	236	7.4	1,104	287	10.9
1995	1,121	351	21.2	256	277	10.6	258	287	15.8	1,635	328	18.7
1996	1,190	310	8.7	274	262	6.6	325	284	12.7	1,791	297	9.2
1997[f]	1,676	292	4.5	840	262	4.3	567	274	12.5	3,086	279	6.0
1998	1,312	295	4.8	454	318	13.3	469	279	8.4	2,236	297	7.4
1999	1,803	310	2.6	560	312	11.6	513	292	9.1	2,876	307	5.5
2000[d]	800	315	2.3	271	307	13.8	134	312	12.8	1,205	312	6.0
2001[d]	778	312	1.8	341	304	16.9	219	311	17.6	1,338	310	8.2

[a] WCT=wild cutthroat trout; HCT=hatchery cutthroat trout; WRB=wild rainbow trout; HYB=wild rainbow x cutthroat hybrid; BRN=wild brown trout.
[b] Includes lake trout (LKT) and kokanee (KOK).
[c] Electrofishing conducted in early November.
[d] No recapture runs due to low flows.
[e] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[f] Major habitat changes with spring runoff.

Appendix E. Electrofishing statistics for the Conant section, South Fork Snake River, 1986-2001. Results are from MR5 database for all sizes of fish.

Year	WCT & HCT[a]				WRB & HYB[a]				BRN[a]				All[b]			
	M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)	M	C	R	R/C (%)
1986	1,171	546	70	13	32	17	2	12	186	107	8	7	1,393	670	80	12
1987[c,d]	299	ND[e]	ND	ND	6	ND	ND	ND	43	ND	ND	ND	348	ND	ND	ND
1988	1,101	567	98	17	41	18	1	6	115	48	4	8	1,257	634	103	16
1989	1,424	1,067	200	19	58	55	10	18	107	79	11	14	1,589	1,201	221	18
1990	1,768	1,527	317	21	118	112	14	12	213	134	12	9	2,102	1,774	343	19
1991	1,159	627	140	22	105	54	9	17	158	120	19	16	1,422	801	168	21
1992[c]	598	ND	ND	ND	34	ND	ND	ND	87	ND	ND	ND	719	ND	ND	ND
1993	998	630	100	16	78	41	6	15	110	66	10	15	1,186	737	116	16
1994[c]	867	ND	ND	ND	100	ND	ND	ND	136	ND	ND	ND	1,104	ND	ND	ND
1995	633	565	77	14	130	143	17	12	154	117	13	11	917	825	107	13
1996	714	548	72	13	165	114	5	4	216	127	18	18	1,097	789	95	12
1997[f]	914	926	164	18	436	476	72	15	352	298	83	28	1,703	1,702	319	19
1998	679	694	61	9	221	259	26	10	276	242	49	20	1,176	1,196	136	11
1999	1,021	899	117	13	347	242	29	12	297	247	31	13	1,665	1,388	177	13
2000[c]	800	ND	ND	ND	271	ND	ND	ND	134	ND	ND	ND	1,205	ND	ND	ND
2001[c]	778	ND	ND	ND	341	ND	ND	ND	219	ND	ND	ND	1,338	ND	ND	ND

[a] WCT=wild cutthroat trout; HCT=hatchery cutthroat trout; WRB=wild rainbow trout; HYB=wild rainbow x cutthroat hybrid; BRN=wild brown trout; M=number of fish marked on marking run; C=total number of fish captured on recapture run; R=number of recaptured fish on recapture run.
[b] Includes lake trout (LKT) and kokanee (KOK).
[c] No recapture runs due to low flows.
[d] Only 3.2 km of larger 4.9 km section was electrofished with drift boat.
[e] ND = no data; no recapture runs.
[f] Major habitat changes with spring runoff.

Appendix F. Estimated abundance (N) of age 1 and older (≥102 mm) wild and hatchery cutthroat trout at the Conant electrofishing section, South Fork Snake River, 1986-2001. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length		N/Section		N/km		N/ha		N/100 m^2	
	(km)	(ha)	P	L	P	L	P	L	P	L
11/4/86	4.9	35.0	9,021 (961)	14,161 (1005)	1,841	2,890	258	405	2.58	4.05
11/5/87	4.9	35.0	NE[a]	NE	NE	NE	NE	NE	NE	NE
10/3/88	4.9	35.0	6,249 (541)	7,306 (370)	1,275	1,491	179	209	1.79	2.09
10/18/89	4.9	35.0	7,403 (434)	7,860 (269)	1,511	1,604	212	225	2.12	2.25
10/11/90	4.9	35.0	8,304 (374)	11,416 (432)	1,695	2,330	237	326	2.37	3.26
10/7/91	4.9	35.0	5,087 (352)	6,854 (340)	1,038	1,399	145	196	1.45	1.96
10/14/92	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/13/93	4.9	35.0	6,004 (515)	7,364 (374)	1,225	1,503	172	210	1.72	2.10
10/7/94	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/5/95	4.9	35.0	4,399 (429)	6,029 (367)	898	1,230	126	172	1.26	1.72
10/3/96	4.9	35.0	5,324 (546)	7,361 (562)	1,087	1,502	152	210	1.52	2.10
10/16/97[b]	4.9	35.0	4,946 (314)	5,609 (190)	1,009	1,145	141	160	1.41	1.60
10/7/98	4.9	35.0	7,435 (851)	8,286 (510)	1,517	1,691	212	237	2.12	2.37
10/13/99	4.9	35.0	7,640 (613)	9,051 (407)	1,559	1,847	218	259	2.18	2.59
10/19/00	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/4/01	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

Appendix G. Estimated abundance (N) of age 1 and older (≥102 mm) wild rainbow and hybrid trout at the Conant electrofishing section, South Fork Snake River, 1986-2001. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length		N/Section		N/km		N/ha		N/100 m^2	
	(km)	(ha)	P	L	P	L	P	L	P	L
11/4/86	4.9	35.0	NU[a]	NU	NU	NU	NU	NU	NU	NU
11/5/87	4.9	35.0	NE[b]	NE	NE	NE	NE	NE	NE	NE
10/3/88	4.9	35.0	NU	NU	NU	NU	NU	NU	NU	NU
10/18/89	4.9	35.0	294	310 (65)	60	63	8	9	0.08	0.09
10/11/90	4.9	35.0	835	1004 (161)	170	205	24	29	0.24	0.29
10/7/91	4.9	35.0	544	657 (135)	111	134	16	19	0.16	0.19
10/14/92	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/13/93	4.9	35.0	449	538 (127)	92	110	13	15	0.13	0.15
10/7/94	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/5/95	4.9	35.0	1,025	1,326 (181)	209	271	29	38	0.29	0.38
10/3/96	4.9	35.0	2,956	4,942 (1845)	603	1,009	84	141	0.84	1.41
10/16/97[c]	4.9	35.0	2,823	3,037 (183)	576	620	81	87	0.81	0.87
10/7/98	4.9	35.0	1,992	2,257 (196)	407	461	57	64	0.57	0.64
10/13/99	4.9	35.0	2,790 (448)	3,207 (317)	569	654	80	92	0.80	0.92
10/19/00	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/4/01	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE

[a] NU = no unbiased estimate possible as R ≤3.
[b] NE = no estimate; recapture runs not made.
[c] Major habitat changes with spring runoff.

Appendix H. Estimated abundance (N) of age 1 and older (≥ 152 mm) wild brown trout at the Conant electrofishing section, South Fork Snake River, 1986-2001. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length		N/Section		N/km		N/ha		N/100 m^2	
	(km)	(ha)	P	L	P	L	P	L	P	L
11/4/86	4.9	35.0	2,166	3,142 (632)	442	641	62	90	0.62	0.90
11/5/87	4.9	35.0	NE[a]	NE	NE	NE	NE	NE	NE	NE
10/3/88	4.9	35.0	1,061	1,652 (776)	217	337	30	47	0.30	0.47
10/18/89	4.9	35.0	596	936 (405)	122	191	17	27	0.17	0.27
10/11/90	4.9	35.0	1,578	1,806 (331)	322	369	45	52	0.45	0.52
10/7/91	4.9	35.0	905	954 (129)	185	195	26	27	0.26	0.27
10/14/92	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/13/93	4.9	35.0	602	663 (194)	123	135	17	19	0.17	0.19
10/7/94	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/5/95	4.9	35.0	1,175	1,442 (440)	240	294	34	41	0.34	0.41
10/3/96	4.9	35.0	1,400	1,538 (196)	286	314	40	44	0.40	0.44
10/16/97[b]	4.9	35.0	1,171	1,809 (507)	239	369	33	52	0.33	0.52
10/7/98	4.9	35.0	1,093	1,189 (90)	223	243	31	34	0.31	0.34
10/13/99	4.9	35.0	2,222 (340)	2,508 (423)	453	512	63	72	0.63	0.72
10/19/00	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/4/01	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

Appendix I. Estimated abundance (N) of all trout (≥102 mm, including lake trout and kokanee) at the Conant electrofishing section, South Fork Snake River, 1986-2001. Results are from MR5 database and analysis using modified Peterson (P) and log-likelihood (L) estimators. Standard deviations are in parentheses.

First marking date	Section length		N/Section		N/km		N/ha		N/100 m^2	
	(km)	(ha)	P	L	P	L	P	L	P	L
11/4/86	4.9	35.0	11,521	13,935 (608)	2,351	2,844	329	398	3.29	3.98
11/5/87	4.9	35.0	NE[a]	NE	NE	NE	NE	NE	NE	NE
10/3/88	4.9	35.0	7,601	9,005 (434)	1,551	1,838	217	257	2.17	2.57
10/18/89	4.9	35.0	8,427	8,788 (262)	1,720	1,793	241	251	2.41	2.51
10/11/90	4.9	35.0	10,596	14,633 (435)	2,162	2,986	303	418	3.03	4.18
10/7/91	4.9	35.0	6,640	7,920 (287)	1,355	1,616	190	226	1.90	2.26
10/14/92	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/13/93	4.9	35.0	7,215	8,058 (324)	1,472	1,644	206	230	2.06	2.30
10/7/94	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/5/95	4.9	35.0	6,785	8,349 (391)	1,385	1,704	194	239	1.94	2.39
10/3/96	4.9	35.0	8,900	11,233 (640)	1,816	2,292	254	321	2.54	3.21
10/16/97[b]	4.9	35.0	8,845	9,659 (234)	1,805	1,971	253	276	2.53	2.76
10/7/98	4.9	35.0	9,999	10,770 (389)	2,041	2,198	286	308	2.86	3.08
10/13/99	4.9	35.0	12,800 (843)	13,873 (443)	2,612	2,831	366	396	3.66	3.96
10/19/00	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE
10/4/01	4.9	35.0	NE	NE	NE	NE	NE	NE	NE	NE

[a] No estimate; recapture runs not made.
[b] Major habitat changes with spring runoff.

2001 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-26

Project: II - Technical Guidance | Subproject: II-G Upper Snake Region

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

Upper Snake Region fisheries management personnel provided private individuals, organizations, public schools, and state and federal agencies with technical review and advice on various projects and activities that affect the fishery resources in the Upper Snake and sinks drainages of Idaho. Technical guidance also included numerous angler informational meetings, presentations, and letters; continuation of the Upper Snake Region portion of the 1-800-ASK-FISH program; and fishing clinics. Additionally, because of the low water conditions, Regional fisheries staff provided updates to local news media and the Idaho Department of Fish and Game website regarding drought conditions and the effects on regional fisheries and boat access sites.

Author:

Jim Fredericks
Regional Fishery Manager

OBJECTIVES

1. To provide current fisheries and habitat information, concerns, and recommendations as needed to Idaho Department of Fish and Game (IDFG) habitat specialists or directly to state, federal, and private parties contemplating projects with the potential to affect fish.

2. To provide technical fish and habitat management advice to public and private landowners and other agencies in order to sustain or enhance fish resources.

RESULTS

Technical guidance was provided to federal, state, county, municipal, and private agencies/entities upon request. Technical guidance was also provided to organized sportsmen's groups, conservation organizations, and private citizens in the form of fish pond development, stocking and management advice, funding requests and project feasibility opinions, and various conservation and educational programs.

Upper Snake Region fisheries management staff provided technical assistance and guidance to the following government agencies and private groups:

Friends of the Teton River
Idaho Department of Parks and Recreation
Idaho Department of Water Resources
Henrys Fork Watershed Council
Upper Snake River Fly Fishers
Teton Regional Land Trust
Jackson National Fish Hatchery
Bonneville County
Henrys Lake Foundation
Idaho Department of Environmental Quality
Natural Resources Conservation Service
PacifiCorp
Idaho Fish and Wildlife Foundation
Henrys Fork Foundation
Boy Scouts of America
Sheridan Creek Restoration Committee
U.S. Bureau of Reclamation
Snake River Cutthroats (TU chapter)
U.S. Fish and Wildlife Service
U.S. Forest Service
U.S. Bureau of Land Management
North Fork Reservoir Company
Palisades Creek Canal Company.
Fall River Rural Electric Cooperative
The Nature Conservancy
HFWC Native Trout Subcommittee

Regional fisheries management and research personnel organized and participated in a South Fork Snake River working group that was designed to identify research needs and priorities. The group coordinated with Bureau of Reclamation and the Flathead Biological Station to review the progress of the Biologically Based System Management (BBSM) project. The project, which was designed to understand the hydrologic regime needed to maintain the long-term aquatic health of the river, was completed for the reach from Palisades Dam to Heise. The group evaluated the need and funding potential for extending the project from Heise to the confluence with the Henrys Fork.

We responded to numerous requests for technical assistance and permit processing by private pond owners. Particular attention was given to private pond permit applications in the South Fork Snake River, Willow Creek, Teton River and Henrys Lake watersheds, where native Yellowstone cutthroat trout *Oncorhynchus clarki* management goals might conflict with private requests to stock rainbow trout in those watersheds.

We gave numerous informational presentations to sporting groups and responded to public concerns and questions about cutthroat trout conservation measures implemented in the region. We provided information to the IDFG ASK-FISH program and news media regarding area fishing conditions. Additionally, because of the low water conditions, Regional fisheries staff provided updates to local news media and the Idaho Fish and Game Department website on drought conditions and the effects on regional fisheries and boat access sites.

2001 ANNUAL PERFORMANCE REPORT

State of: Idaho Program: Fisheries Management F-71-R-26

Project: III - Habitat Management Subproject: III-G Upper Snake Region

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

Regional personnel assisted with or conducted a range of habitat improvement activities in 2001. Routine maintenance and repair operations were conducted on Henrys Lake riparian fences and irrigation diversion fish screens, riparian fences on Sellars Creek and Teton River tributaries, and irrigation diversion screens on Burns, Palisades, and Rainey creeks. New construction projects included a permanent fish weir and trapping facility on Pine Creek and installation of a box culvert on Tex Creek bridge to improve fish passage.

Author:

Jim Fredericks
Regional Fishery Manager

OBJECTIVES

1. Work with landowners to improve/restore habitat on degraded streams on private property with good potential to enhance wild trout recruitment.

2. Provide up and downstream fish passage in key wild trout spawning and recruitment streams.

RESULTS

Henrys Lake

Since the early 1980s, the Upper Snake Region fisheries management program has worked with local ranchers and the Henrys Lake Foundation to improve Henrys Lake tributary spawning and rearing habitat, to provide fish passage around in-stream barriers, and to reduce cutthroat trout *Oncorhynchus clarki* fry losses to irrigation diversions. These projects include riparian fence to control livestock damage, reestablishment of riparian vegetation communities, and irrigation diversion fish screens. Each project is designed to maintain or increase the significant gains that have been achieved in the last 16 years towards restoring and enhancing cutthroat spawning and recruit production for the Henrys Lake fishery.

In 2001, we conducted a maintenance and operations program. Temporary personnel at the Henrys Lake hatchery managed riparian fence and fish screens on the Henrys Lake project under standard maintenance schedules. No new riparian fence, fish screens or riparian habitat projects were implemented at Henrys Lake.

South Fork Snake River Tributaries

The Idaho Department of Fish and Game (IDFG) Engineering crew constructed a permanent fish weir and trapping facility on Pine Creek in October 2001. This represents the final weir in the program to install fish traps that allow removal of rainbow *O. mykiss* and hybrid (cutthroat x rainbow) trout on the four major South Fork tributaries.

The other three weirs on Burns, Rainey, and Palisades creeks were operated from early March through July 2001. In Burns Creek, a total of 3,158 trout were captured. Only three of these were hybrids. Based on phenotype, the remaining 3,155 trout were Yellowstone cutthroat trout *O. clarki bouvieri*. The Rainey Creek weir was operated from the first week of March until July 6. By the middle of June, the water had been completely diverted out of the creek. No fish were able to reach the weir. The Palisades weir was installed the first week of March. The total catch was 680 trout. This was likely compromised by the low water and the diversion of streamflow through the spillway. Sixty-four of the fish collected were rainbow trout, 114 were hybrids, and 498 were Yellowstone cutthroat trout. Palisades Creek was the only area where overlap in timing among the three taxa was observed. The entire escapement occurred between April 19 and July 13, with rainbow trout collected April 1 through May 28, hybrids

collected March 27 through June 17, and Yellowstone cutthroat collected May 25 through July 13.

The IDFG cooperatively operated and maintained two irrigation diversion screens on Burns and Palisades Creeks, important South Fork Snake River cutthroat spawning tributaries. The screens received normal service and required no additional maintenance or repair in 2001.

Willow Creek Tributaries

A box culvert was installed in Tex Creek on the lower Tex Creek road. The previously existing bridge was in need of replacement. The purpose of the box culvert (bottomless arch) design was to insure fish passage.

We conducted routine maintenance of riparian fences on Sellars Creek in 2001. No new fence was constructed.

Teton River Tributaries

We conducted routine maintenance on riparian fences on several tributaries to the Teton River in the upper river valley. Fences that were no longer necessary because of acquisitions by conservation minded landowners and removal of livestock were removed.

2001 ANNUAL PERFORMANCE REPORT

State of: Idaho | Program: Fisheries Management F-71-R-26

Project: IV – Lake Renovation | Subproject: IV-G Upper Snake Region

Contract Period: July 1, 2001 to June 30, 2002

ABSTRACT

In May 2001, we used streamside observation and electrofishing to search for the presence of any fish following the 2000 chemical treatment of Golden Lake and the Thurmon Creek drainage in Harriman State Park. On May 7, 2001 a large rainbow trout *Oncorhynchus mykiss* was discovered on a redd in West Thurmon Creek near its confluence with Golden Lake. There were five large spawning rainbow trout captured in West Thurmon Creek, and more redds were discovered. No brook trout *Salvelinus fontinalis* were detected in any stream. A total of 6,700 age-1 Yellowstone cutthroat trout *O. clarki bouvieri* were stocked into Golden Lake on June 13, 2001 and another 8,000 age-0 Yellowstone cutthroat trout were stocked in Golden Lake and tributaries in October 3, 2001.

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Regional Fishery Manager

INTRODUCTION

In 1997, the Native Trout Subcommittee of the Henrys Fork Watershed Council began to identify waters in the Henrys Fork watershed where Yellowstone cutthroat trout *Oncorhynchus clarki bouvieri* populations could be enhanced or reintroduced. The subcommittee is comprised of representatives from Idaho Department of Fish and Game (IDFG), Caribou-Targhee National Forest (CTNF), Idaho Department of Parks and Recreation (IDPR), Henrys Fork Foundation (HFF), The Nature Conservancy of Idaho (TNC), Greater Yellowstone Coalition (GYC), the Bureau of Land Management (BLM), and the North Fork Reservoir Company. The subcommittee identified the Thurmon Creek drainage above Golden Lake dam, located within Harriman State Park and wildlife sanctuary, as a possible site for reintroduction. In 1998 the IDFG initiated comprehensive fish surveys throughout the drainage and developed strategies to eliminate non-native fishes. The entire drainage was chemically treated in fall 1999. Because brook trout *Salvelinus fontinalis* and rainbow trout *O. mykiss* were found following the 1999 treatment, the drainage was re-treated in October 2000 to remove all existing fish.

OBJECTIVES

1. Assess the 2000 chemical treatment.

2. Reestablish Yellowstone cutthroat in Golden Lake.

3. Identify possible factors compromising the success of the fish eradication efforts.

METHODS

In May 2001, we used streamside observation and electrofishing to search for the presence of any fish following the 2000 chemical treatment. When fish were identified, they were removed when possible and redds were destroyed.

Because personnel observed mature rainbow trout attempting to pass over the Golden Lake spillway and into the project area, immigration of spawning fish from downstream waters was identified as a possible threat to the restoration efforts. Personnel from IDFG and IDPR met with dam safety regulatory personnel to identify possible modifications of the Golden Lake spillway. Inspection of the dam indicated that a concrete block on the dam's spillway formed a pool, possibly allowing large trout to jump over the dam. Removal of the block was determined to be a safe and effective alternative.

During the 2000 and 2001 spawning operations at Henrys Lake Hatchery, spawning Yellowstone cutthroat trout were selected from the Henrys Lake Hatchery Creek fish ladder as brood stock for production of juvenile fish for transplant to Golden Lake. To insure genetic integrity of transplanted fish, tissue samples of each fish were sent to the Washington Department of Fish and Wildlife's genetic laboratory.

RESULTS

On May 7, 2001 a large rainbow trout was discovered on a redd in West Thurmon Creek near its confluence with Golden Lake. The redd was destroyed, but no eggs were recovered in a modified Surber net downstream. Later that week, CTNF and IDFG worked cooperatively to extensively electrofish the East, West and Middle forks of Thurmon Creek. No brook trout were detected in any stream. There were five large spawning rainbow trout captured in West Thurmon Creek, and more redds were discovered. Redds that were detected were destroyed to the greatest degree possible.

With the pipe barrier removed, there will be a 1.5 m vertical jump from the concrete floor of the structure to the spillway, thereby minimizing the potential for successful migration of rainbow trout over the dam. The concrete was cut and removed on August 2, 2001, and additional riprap was placed below the spillway.

Genetic analysis of the brood fish from Henrys Lake indicated no evidence of rainbow trout introgression. Therefore, 6,700 age-1 Yellowstone cutthroat trout were stocked into Golden Lake on June 13, 2001. Another 8,000 age-0 Yellowstone cutthroat trout were stocked in Golden Lake and tributaries on October 3, 2001.

DISCUSSION

The Native Trout Subcommittee of the Henrys Fork Watershed Council met to discuss alternatives to minimize successful rainbow trout reproduction and the potential introgression with Yellowstone cutthroat trout. The biggest factor limiting the management alternatives is a pair of trumpeter swans that use Golden Lake as a nesting site. Because nesting swans are intolerable of disturbances, such as electrofishing or constructing and operating weirs on the tributaries, activities to remove spawning rainbow trout are considered high risks to the Rocky Mountain trumpeter swan sub-population. For this reason, rainbow trout suppression was not considered an acceptable alternative.

The subcommittee concurred that complete elimination of rainbow trout was not possible. Consequently, the subcommittee agreed that the best course of action is to minimize the level of introgression by increasing the number of Yellowstone cutthroat stocked. The genetic makeup of the parental stock of all fish stocked in Golden Lake in 2001 was assessed to minimize the risk of stocking less than pure Yellowstone cutthroat trout. The time and expense related to the genetic analysis of the parental stock as well as the logistics of keeping the progeny separate in the hatchery was significant. Furthermore, because some level of population introgression now seems unavoidable, the decision was made to continue to stock phenotypically pure Yellowstone cutthroat trout but to not assess genotype.

RECOMMENDATIONS

1. Continue broodstock selection at Henrys Lake Hatchery to provide additional Yellowstone cutthroat trout for stocking in 2002 -2006.

2. Stock phenotypically pure, pre-spawn adults from Henrys Lake Hatchery Creek spawning ladder annually for three consecutive years beginning in spring 2002. Review efficiency of continued stocking of Henrys Lake adults in 2004.

3. Maximize stocking of juvenile (age-0) Yellowstone cutthroat trout annually for five consecutive years beginning in fall 2002.

4. Beginning in 2002, restore the native minnow *Cyprinidae spp.* and sculpin *Cottidae spp.* assemblage to the drainage. For the purpose of this plan, native minnow and sculpin are defined as any minnow or sculpin species, excepting Utah chub *Gila atraria*, that are captured in Thurmon Creek between Golden and Silver lakes and whose native range includes Thurmon Creek.

5. Annually evaluate effectiveness of existing fish barrier. Improve barrier on East Thurmon ditch. Close auxiliary outlet on Golden Lake dam. Remove grating on dam outlet.

6. Use gill nets in Golden Lake and electrofishing or other appropriate tools in tributaries to assess population attributes of Yellowstone cutthroat trout. To avoid disturbance of trumpeter swans, these actions are subject to the approval of CTNF and Harriman State Park, which will consult with appropriate agency and independent wildlife biologists. These events will occur at two to three year intervals until the population is considered established.

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